INSIDE: HOW AN ELK BECOMES SOIL
Montana Outdoors
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NOVEMBER–DECEMBER 2014
NOT LISTED
Keeping fish and wildlife from becoming endangered species
IN THIS ISSUE:
ARE LOCUSTS GONE FOR GOOD?
A BIRD WATCHING HOLIDAY TRADITION
THE BEST GOOSE LEGS YOU'VE EVER EATEN
BIOLOGISTS AND VOLUNTEERS SOLVE THE BITTERROOT ELK PUZZLE

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RUN FOR IT!
Locusts swarm workers in Israel in 1955. Similar infestations hit Montana in the late 1800s. Why haven't we seen those Rocky Mountain locusts since then? Find out on page 30. Photo source: Wikipedia.

FRONT COVER
In August the U.S. Fish & Wildlife Service decided not to list the wolverine as federally endangered. Learn why on page 14. Photo by Eric Rock.

Montana Outdoors

NOVEMBER–DECEMBER 2014

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Spot on

The essay by Allen Morris Jones on hunting ("Getting There," September-October) does a great job of expressing my own feelings about hunting each fall with my dad and brother. Thanks.

Michelle Miller
Spokane, WA

Reverting to type?

I read with interest your article on FWP's elk movement studies "Where Are All the Elk?" (September-October). You confirm my own unscientific field observations made over the past ten years of more and larger herds of unhuntable elk in western Montana valleys and less sign or sightings on national forest land. I know of at least one herd that now lives most of the year within a mile of I-90 in an area where small bunches of elk were the norm for the past 50 years. As far as I know, no significant change in land ownership has occurred here, so wolves may be more suspect than you think.

I suggest that serious study of all possible causes be conducted. Historically, elk banded together and stayed in open areas to escape predators. Man and modern rifles changed that. Perhaps elk are simply reverting to type and only coincidentally taking advantage of safe havens that "No Hunting" areas provide.

Clair A. Brazington
Nine Mile Falls, WA

Sage-grouse habitat is key

In FWP director Jeff Hagener's "Our Point of View" column on the recent sage-grouse season closure decision (September-October), he stated: "Though the U.S. Fish & Wildlife Service has said that hunting is not a major threat [to sage-grouse], it is important for us to show that Montana takes recent declines seriously."

Jeff goes on to state that hundreds of millions of dollars have already been spent across the West. These taxpayer and sportsmen's dollars are primarily going to private landowners and supposedly aimed at preventing further harm to the sage-grouse and its habitat. However, FWP's own monitoring data since 2008, which Jeff cites, indicates that dramatic declines continue statewide for sage-grouse in Montana (down 62 percent). Declines are even worse in other western states. These declines are significant, so if the governor and FWP are "serious" about sage-grouse recovery, they should take the steps necessary to reverse these trends. Of course that would mean acquiring, protecting, and restoring habitat.

> If the governor and FWP are 'serious' about sage-grouse recovery, they should take the necessary steps to reverse the trend."

Closing the hunting season is a diversion to give the impression that something meaningful for sage-grouse is actually being done. What's really needed are tough decisions about habitat protection and restoration, not further mitigation.

Glenn Hockett
Volunteer President
Gallatin Wildlife Association
Bozeman

Director Jeff Hagener replies: Mr. Hockett is correct that one of the most important steps to recovering sage-grouse is protecting habitat. To that end, Governor Steve Bullock recently signed an executive order establishing the Sage-Grouse Habitat Conservation Program, which seeks to maintain state management of the sage-grouse by protecting its habitat, while respecting private property rights. The executive order places restrictions on future oil drilling and other activities that disrupt sage-grouse breeding or migration. It also establishes no-occupancy zones that extend six-tenths of a mile around identified breeding leks. Roads will not be allowed in those areas, and other activities, such as oil and gas exploration, would only be allowed seasonally. Existing land uses, including agriculture, coal mines, and oil wells already in place, would be exempt. These new restrictions are aimed at preventing disturbances, protecting critical habitat, and increasing overall sage-grouse numbers. If they are successful, and if the U.S. Fish & Wildlife Service does not list the species, I'm hopeful that Montana can reopen to hunting the areas we decided to close this year.

Yum

We tried your Blue Grouse and Shallots recipe ("Eating the Outdoors," September-October) with pheasants in lieu of grouse. It was fabulous. Please keep printing new recipes.

Lee Ebeling
Great Falls

Call before you fly

As an operator of a licensed air taxi service, I would like to clarify a point made in your article "Finding a Way In" (September-October). You state that using aircraft to access isolated public lands is legal. In fact, State of Montana recreational use rule 36.25.145 (15) states that state lands cannot be legally accessed by aircraft. Landings on certain areas of national forests may be legal, but no U.S. Forest Service administrator I have talked to has fully confirmed that. They tell me the agency does not want aircraft to land anywhere other than on designated airstrips. The Bureau of Land Management is the only federal agency that has acknowledged to me that aircraft landings are legal under certain circumstances on its managed lands. If you are contemplating using an aircraft to access public lands, it would be wise to contact the local federal or state agency office for information.

Rick Geiger
Cut Bank

Write to us

We welcome all your comments, questions, and letters to the editor. We'll edit letters as needed for accuracy, style, and length. Reach us at Montana Outdoors, P.O. Box 200701, Helena, MT 59620-0701. Or email: tdickson@mt.gov.

Goose confit

By Tom Dickson | Preparation Time: 12 hours | Cooking Time: 3 to 5 hours | Serves: 4

INGREDIENTS

4 Canada or 8 snow goose legs, rinsed and patted dry
1½ t. kosher salt
1 t. freshly ground black pepper
2 cloves garlic, mashed
1 T. sugar
½ t. dried thyme
Optional: Pinch each of powdered ginger, powdered nutmeg, and powdered cloves
1 bay leaf, crumbled
Olive oil, duck fat, or rendered goose fat
Roasted or mashed potatoes
Optional: Arugula (a peppery leafy green found in the produce section of most grocery stores)

DIRECTIONS

1. In a small bowl, combine salt, pepper, garlic, sugar, spices, and bay leaf. Press the mixture firmly into the skin of the legs. Place legs in a pan in one layer. Cover tightly with plastic wrap and refrigerate 8 to 12 hours.

2. The next day, heat oven to 225 degrees. Thoroughly wipe off the salt and spices. Place goose legs, fat side down, in a large ovenproof skillet, with legs fitting snugly in a single layer.

3. Pour in olive oil or melted duck fat to nearly cover the legs. Cover skillet with lid or foil.

3a. (alternate) Heat legs over medium-high heat until fat starts to render. After about 20 minutes, or when there is about ¼ to ½ inch of rendered (liquefied) fat in the pan, flip goose legs, add enough olive oil to nearly cover the legs, and cover skillet with foil or lid.

4. Place skillet in oven and braise legs, flipping them once, for 3 to 4 hours or until the meat is almost falling off the bone. Increase oven temperature to 400 degrees. Remove legs from skillet (reserve the fragrant fat or oil for other uses) and place them skin side up on a cooling rack set on a baking sheet. Roast for 20 to 40 minutes until the skin crisps. Alternatively, place legs skin side down in a nonstick skillet over medium heat for 10 to 15 minutes or until the skin crisps.

5. Serve duck hot or warm over roasted or mashed potatoes with the arugula on the side.

For years I never knew how to cook the tough, chewy legs of the Canada and snow geese I shot. Then I visited southern France.

There I learned the French have for centuries prepared a dish called confit (*kone-FEE*)—duck or goose thighs braised (slow cooked at low heat) in liquefied duck fat. Traditionally this was used as a method of preservation. The slow-cooked, salt-cured meat was then put in ceramic jars with a thick layer of duck fat that sealed out moisture and thus bacteria. French farmers could keep jars of confit in the root cellar throughout the winter.

Though refrigeration has made the preservation process unnecessary, chefs worldwide still prepare duck and goose confit for its rich flavor. While cycling through France's Dordogne region one September several years ago, my wife and I were surprised to find that nearly every restaurant featured confit. We gorged ourselves. I couldn't wait to get home for the waterfowl season and make it myself.

It took much experimentation to make the process work for wild geese and modern tastes. Many of the traditional recipes I found call for using lots of salt (to draw out moisture from the meat and inhibit bacterial growth) and duck fat (as the braising liquid). Contemporary chefs, concerned more with taste than long-term storage, use far less salt. As for duck fat, there's no beating its phenomenal flavor. Many chefs consider it essential for any well-stocked refrigerator, and I admit to buying a gallon online every year from a duck farm in upstate New York. But olive oil is a suitable substitute. If your Canada goose legs are especially fatty, render the fat to use as the braising liquid (see the No. 3a alternate in the directions at right).

—Tom Dickson is editor of Montana Outdoors.

SHUTTERSTOCK

Montana's Thanksgiving Bounty

This Thanksgiving, as you're gathered around the table about to give thanks—for good health, for loving friends and family members, for our soldiers overseas—consider adding another blessing: for living in a state so rich in wildlife.

That's something easy to forget in the many ongoing conflicts over wildlife. Rather than marvel over Montana's abundant wildlife (something visitors from other states do regularly), we Montanans spend a great deal of time disagreeing over that wildlife.

These discussions—which often blow up into full-scale arguments—can exhaust all parties and often frustrate an agency such as ours charged with managing those conflicts. But they do indicate a passion for fish and wildlife—and that's a good thing. To paraphrase one noted Canadian biologist, I'd rather people argue over fish and wildlife than not give a damn. If they are arguing, at least they care.

Unfortunately, too often what gets lost in these discussions is the fact that we have all these remarkable resources in the first place. This is a state wild enough to have wolverines, after all, not to mention lynx, grizzly bears, mountain goats, and arctic grayling.

Few places on earth offer such diversity of both coldwater and warmwater fisheries—from cutthroat trout in cold mountain lakes to channel catfish in warm rivers. As for bird life, we're home to more than 400 bird species, including trumpeter swans, neotropical warblers, long-billed curlews, harlequin ducks, and two dozen species of raptors.

Right now, in the heart of the hunting season, opportunities are staggering—pheasants, sharptails, Huns, mountain grouse, and waterfowl for the shotgunner; pronghorn, elk, mule deer, white-tailed deer, moose, mountain goats, and bighorn sheep for the rifle and archery hunter. Even those who don't hunt value knowing that those wild and beautiful animals are out there in numbers often exceeding what astounded pioneers to this region two centuries ago.

Why such fish and wildlife diversity and abundance? To some degree, it's because the Montana landscape is so big and diverse. Partly, it's the state's relative lack of people to pave over, carve up, pollute, and otherwise degrade fish and wildlife habitat, as has happened in so many other states.

But mostly, in my opinion, it's because Montanans again and again have come together to conserve the land and water where wild animals live. And they've made prudent management decisions about that wildlife, such as hunters voluntarily restricting harvest so that depressed populations can rebound.

Yes, strongly differing opinions exist about what to do about wolves, or bison, or sage-grouse. But those highly contentious species are just a handful of the hundreds that live here, animals that elicit far more wonder and joy than they do argument and rancor. Most Montanans, from the rural stockgrower to the urban vegan, say they appreciate and care about wildlife, that they like to hear songbirds, see big game animals—even large carnivores if they aren't bothering livestock—and know that the state's wildest reaches are home to fishers, American pika, boreal owls, and maybe even a woodland caribou or two.

If you're proud to be a Montanan—as I am—one of the main reasons may be that everyone here has done such a good job conserving our wildlife. That's the common bond among the people of this state. We all want to see wildlife and know that populations are both healthy and in balance with other species.

If you're proud to be a Montanan—as I am—one of the main reasons may be that everyone here has done such a good job conserving our wildlife.

People have different ways of enjoying and appreciating these wild animals. Some want to watch. Others prefer to photograph, or trap, or hunt. An increasing number are happy to connect with wildlife simply by looking at videos on their smartphones or e-tablets. More power to them. At least they are interested.

That's not the case in much of America and the world. More and more, people don't care about wild places and wild things. As a result, wildness disappears. In our rapidly developing world, conservation doesn't just happen. It takes people to make it work, to insist that wildlife must exist for everyone to enjoy—in whatever way they choose—both now and in the future.

We Montanans may spend a lot of time disagreeing over wildlife issues. But at least we still have plenty of wildlife to argue over. That's something every one of us can be thankful for.

—**M. Jeff Hagener,** *Montana Fish, Wildlife & Parks Director*

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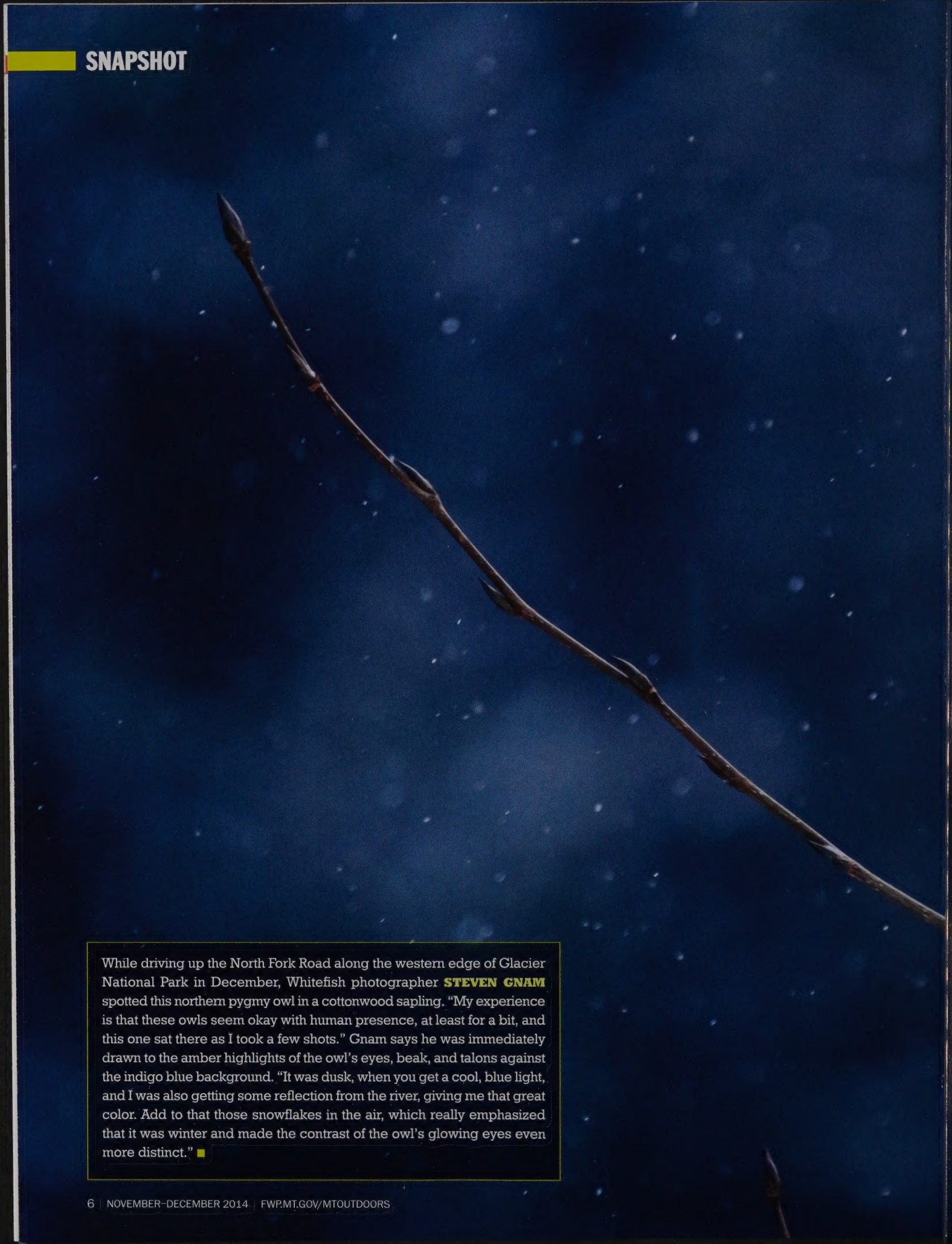
KENTON ROWE

MEDIA MANAGER

TOM PALMER
Information Bureau Chief, Helena

One of the most important parts of my job is working with the media. We get calls all the time from reporters who are following any number of breaking stories—maybe a poaching incident, a commission meeting, or an orphaned grizzly cub—and are trying to gather good information. So I either respond myself or put them in touch with the best person here in the department to get them the facts they need. It's extremely rare that I feel a reporter is trying to trap us or play "gotcha." I worked for years as a journalist myself, and I know that their main goal is to get the story right, and that's been our goal here at the department. One thing that is different from, say, 20 years ago is social media and the speed at which news travels. Nowadays a reporter will call, conduct an interview, hang up, and immediately post a 140-word Twitter feed. So that makes it doubly important—to them and to FWP—for us to be extremely accurate with the information we provide. There's really no room for error.

Fortunately, one thing that has remained solid in this department through the 28 years I've been here is the knowledge of FWP staff. No matter who calls and what the question is, I always know I'm surrounded by the very best information sources possible.



While driving up the North Fork Road along the western edge of Glacier National Park in December, Whitefish photographer **STEVEN GNAM** spotted this northern pygmy owl in a cottonwood sapling. "My experience is that these owls seem okay with human presence, at least for a bit, and this one sat there as I took a few shots." Gnam says he was immediately drawn to the amber highlights of the owl's eyes, beak, and talons against the indigo blue background. "It was dusk, when you get a cool, blue light, and I was also getting some reflection from the river, giving me that great color. Add to that those snowflakes in the air, which really emphasized that it was winter and made the contrast of the owl's glowing eyes even more distinct." ■

1989-90

The last winter Flathead Lake froze completely.

Reasonable expectations

This time of year, many hunters seek advice on elk hunting from FWP offices. No problem with that. FWP is a public agency with lots of hunting information. But hunters should have realistic expectations about what the department's staff can tell them. "Where are the elk?" is not a sensible question. Elk move around. Where they are one year—or even one day—may not be where they are the next. As one front desk worker at a busy regional office says, "If we knew where to get an elk easily, all of us here would shoot one every year, and that's definitely not the case." FWP staff can provide general information about public land and Block Management Areas in specific regions. But you'll have to get out and find the elk yourself. ■

Now what? Hunters are increasingly using the gutless method of field dressing to lessen the load back to the vehicle, especially in the backcountry.

HUNTING

Gutless wonder

Maybe it's their lower back talking. Or their knees. Or they're hunting farther in the backcountry than they used to.

Whatever the reason, it seems that a growing number of deer and elk hunters are using the "gutless" method of field dressing rather than dragging the entire carcass out. Though no one has measured the increase, the sheer number of gutless method YouTube videos posted in recent years indicates a trend.

Traditional field dressing requires eviscerating ("gutting") the deer or elk in the field. This allows some heat to escape, thus reducing meat spoilage. It also lessens the weight of the carcass as it is dragged by hunters, or quartered and packed onto horses, back to the vehicle. From there, the deer or elk is transported to a meat processor or the hunter's home for aging and butchering.

One problem is the dragging. When field dressed, a bull elk carcass still weighs around 400 pounds, requiring a team of hunters to move it. Even a deer can often be more than one hunter can handle, especially in downed timber or when hauled uphill.

Another problem with traditional field dressing is that the hide remains on the cavity. By trapping heat, this increases bacteria that can spoil meat in thick regions such as the hips and shoulders.

Field dressing is also messy and often smelly, with piles of bear-attracting intestines spilled out onto the ground.

With the gutless method, intestines remain in the animal's body cavity and only the meat is taken. First, the hide is cut in strategic spots and peeled back to reveal the animal's major muscles. Deer hunters then cut off the entire front and back quarters, as well as the loin, tenderloin, and neck. Elk hunters often go a step further and cut the meat off the bones, which they leave behind, further reducing total packing weight.

The Internet is filled with videos of hunters demonstrating the gutless method, deboning, or both. One of many worth watching is by Randy Newberg, host of the Bozeman-based *On Your Own Adventures* TV show (Google "Newberg Gutless").

A few things to keep in mind if you try gutless field dressing or deboning:

- You must retain evidence of the animal's species and sex during transport. That means keeping the testicles or teats, as well as the tail (for deer identification) attached to one hindquarter.
- The gutless method can take a bit longer than traditional field dressing, so give yourself some extra time.
- Because it's often cold and dark while field dressing, it's tempting to leave behind, on the carcass, meat you might ordinarily save if you were butchering the entire animal back home. Don't. It's illegal and unethical. In Montana, you must take all four quarters above the knee (front) and hock (back), which means keeping the shanks (which are great for braising). Don't forget the neck meat (bind up in cooking string for pot roasts) and flank meat (make into sausage). ■

CLOCKWISE FROM TOP LEFT: ILLUSTRATION BY MIKE MORAN; DENVER BRYAN; ANIMAL TRACKS ILLUSTRATION BY LUKE DURAN/MONTANA OUTDOORS; SHUTTERSTOCK; KRISTI DUBOIS/FWP; THOMAS LEE

WILDLIFE WATCHING

A good time to track

Whether you're a hunter or someone who simply wants to know what passed this way, November and December are top months for tracking wildlife. Mud and fresh snow capture paw- and hoofprints, sometimes for days, allowing you to figure out what animals made them.

The best conditions are an inch or two of fresh snow—though not powder—over a firm base. Tracking is usually ideal roughly three days after a snowfall, when animals have had plenty of time to move about, but not so long that the snow melts or tracks become buried under wind-blown snow.

Wild dogs (foxes, coyotes, wolves) have diamond-shaped paws longer than they are wide. Wild cats (bobcats, lynx, cougars) leave pugmarks that are more circular. In addition, wild dogs have four toes with claw marks, while wild cats have four toes with no claw marks (because they retract their claws when walking). Most members of the weasel family (such as martens, fishers, and wolverines but, oddly, excluding weasels themselves) have five toes and claw marks.

"Most important in becoming a nature detective is for you to learn to think like an animal—more specifically, like a wild animal," advises tracking expert and University of Colorado wildlife research associate James Halfpenny in *A Field Guide to Mammal Tracking in North America*. "Once you know the natural history of the animals you are working with, the easier it is to think like them." ■

NATURAL HISTORY

Frogs under the frost line

Even with down coats, insulated boots, and heated vehicles, it can be tough to stay warm in Montana's infamous winters. So how do sensitive, water-loving animals such as toads, salamanders, and frogs do it?

Columbia spotted frog

For one thing, amphibians and other cold-blooded animals go dormant long before winter's onset, says Bryce Maxell, a zoologist with the Montana Natural Heritage Program. They can't wait too long or cold temperatures will slow them down before they can find a suitable place to hole up. According to Maxell, most Montana salamanders and toads overwinter below the frost line in burrows they dig themselves or ones constructed by other species. The plains spadefoot, for example, digs as deep as 20 feet below the surface of loose, sandy soils. Montana's two native aquatic frog species, the northern leopard frog and Columbia spotted frog, overwinter below the ice of lakes and ponds for up to nine months each year, absorbing oxygen from water through their skin.

A few Montana terrestrial frog species, such as the boreal chorus frog, can actually survive being partially frozen, Maxell says. Their livers produce glycerol, which acts as a natural antifreeze that prevents formation of damaging ice crystals within individual cells, even as spaces around the cells freeze. In some species, such as the wood frog, as much as 65 percent of the amphibian's body can freeze solid repeatedly throughout winter with no apparent ill effects. "It's amazing what evolutionary solutions animals have come up with to survive Montana's extreme climate," Maxell says. ■

Know your elk

Special regulations in many elk hunting districts restrict harvest to only antlerless elk or certain sizes of bulls. Antlerless-only regulations can help trim overabundant elk numbers. Bull regulations can result in bigger bulls and increase the ratio of males to females. Before heading afield, hunters should know the legal definitions of the four elk categories:

Antlerless elk: Male or female with no antlers, or both antlers less than 4 inches long as measured from the top of the skull. Generally these are calves and cows, but sometimes they can be yearling bulls.

Antlered bull: An elk with one or two antlers at least 4 inches long as measured from the top of the skull.

Spike bull: (See photo below.) An elk, usually 1½ years old (also known as a yearling), with antlers that do not branch; or, if branched, the point (tine) is less than 4 inches from the tip to the main antler beam. Roughly 20 percent of yearling bulls have a point longer than 4 inches.

Brow-tined bull: An elk with one or both antlers having a point on the lower half at least 4 inches long. ■

Spike (yearling) bulls have antlers that do not branch or only slightly branch.

'TIS THE SEASON TO BE COUNTING

During the Audubon Christmas Bird Count, expert and beginner citizen-scientists tally every bird they spot in an effort to aid avian conservation. By Tom Dickson

On a windy Thursday morning in late December, at the Broadway Flying J Truck Stop in Belgrade, two dozen birders gather over coffee and pancakes to hear instructions for their participation in the annual Audubon Christmas Bird Count (CBC).

With route maps in hand, the volunteers break into four groups and head into the parking lot. Over the rumble of idling semis, they call out "Have fun" and "Good luck" before driving off. Each group will look for birds in one of four quadrants of a 15-mile-diameter "count circle" in the lower Jefferson and Madison Valleys between Three Forks and Norris. Within each quadrant, they will follow prescribed routes for the all-day count. Many are familiar with the drill, having taken part in earlier counts around Bozeman and Ennis. "We're sort of a roving band of birders," says Melissa Scott, an international naturalist and tour guide who lives in Bozeman.

I join Scott; her best friend and expert birder, Kathryn Hiestand; John Parker, a retired trails manager for Yellowstone National Park; and Judy Tolliver, a retired university administrator who recently moved to Bozeman from Illinois. We drive 30 miles west to the tiny, handsome town of Willow Creek to begin searching trees, power lines, and skies. Our goal for the next eight hours: Count every single bird we spot.

Long tradition

The CBC began in eastern states at the turn of the 20th century. Wildlife conservation was in its early stages, and a growing number of people were concerned about declining bird populations. New England ornithologist Frank Chapman, founder of a magazine that later became *Audubon*, proposed a nationwide bird tally and led the first count on Christmas Day 1900.

Participation in the annual bird survey has steadily grown. In recent years, more than 70,000 people have counted birds in more than 2,000 locations worldwide, mostly in the United States and Canada. That makes the CBC the world's largest and longest-running survey conducted by citizen-scientists.

Montana bird advocates joined the Christmastime survey in 1908, with a count in Bozeman, and have participated most years since. Bird counts are conducted in roughly 30 locales across the state. Local Audubon chapters usually coordinate the outings, held between mid-December and early January. During a single calendar day, volunteers follow assigned routes, which vary little from year to year, to ensure scientific consistency.

EARLY RISERS From left to right: Birders gather to discuss routes and transportation at a truck stop near Belgrade; Melissa Scott scans a cemetery for great horned owls; New England ornithologist Frank Chapman, who founded the Christmas Bird Count in 1900 (photo date unknown). Facing page: Bohemian waxwing.

LEFT TO RIGHT: DONALD M. JONES; TOM DICKSON; TOM DICKSON; AUDUBON.ORG

When paired with results of the springtime North American Breeding Bird Survey, the counts show bird population concentrations, occurrence changes, and upward and downward population trends. Scientists with the National Audubon Society, American Bird Conservancy, other conservation groups, and state and federal wildlife agencies use the tallies to assess the health of bird populations and help guide conservation activities. Because birds are early indicators of environmental changes, the CBC information helps focus attention on threats facing other wildlife species, too.

It's also just plain fun. Bird watchers consider the annual survey part of their holiday tradition, meeting up with old friends for a day afield. "It's a great way for birders to see each other in the winter when we might not otherwise," says Scott.

Beginners are always welcome. Bird identification skills aren't essential because experts in each group aid in identification. All that's required is a willingness to look long and hard for winged wildlife.

Tombstone owls

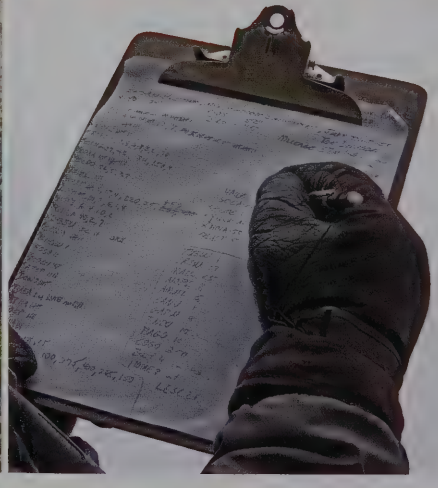
Our group's first sighting, by Hiestand, is a northern shrike along a road just outside Willow Creek. Then a flock of Canada geese flies overhead, and Parker pulls a clipboard from his backpack to begin the day's tally. As the five of us walk through town, he, Scott, and Hiestand begin announcing the birds they spot—or, even more impressive, identify by call. It takes a while for Tolliver and me, both novice birders, to see many of the birds even after the others have identified them and pointed directly to their locations ("It's right *there*.")

As expected in a residential area, the initial tally is mostly house sparrows, Eurasian collared-doves, house finches, magpies, and black-capped chickadees. In Parker's truck we drive around town, binoculars out, peering into backyards, especially those with bird feeders. Walking down one alley, Scott hears a distinctive high-pitched trill and points up at a flock of Bohemian waxwings ravaging the berries of a large mountain ash. She explains that the Bohemian can be differentiated from its close cousin the cedar waxwing by its larger, plumper size and shape, white markings on the upper wings, and russet (rather than white) undertail. "Also, most cedars migrate south in winter," Scott adds, "so the odds are that we're seeing Bohemians."

At around 10 a.m. we drive to a nearby cemetery, established in 1864. Before we're even out of the truck, Hiestand hears a Townsend's solitaire—a single, lonely whistle—then points to it in a tall juniper. As we wander past headstones beneath stands of towering Douglas fir, she spots several raptor pellets beneath a tree. Pellets are undigested food that some birds regurgitate. "If you break them up and see small rodent bones, the pellet is probably from an owl," Hiestand says, showing us the lower jaw of a mouse. Encouraged that at least one of the large raptors is in the grove, we scan the branches until Scott spots a great horned owl that immediately flies off. As we try to relocate it, she offers a tip: "Listen for magpies." Sure enough, several are making a racket in the distance. We head in that direction and quickly spot the magnificent owl standing with shoulders hunched, amber eyes glowing in the shade of the dark tree limbs just 20 feet overhead, and surrounded by its black-and-white tormenters. Scott says birders regularly see certain species in the same spots year after year during the CBC. "We can go to a place like this cemetery and know ahead of time we'll have a pretty good chance of seeing, in this case, a great horned owl," she says.

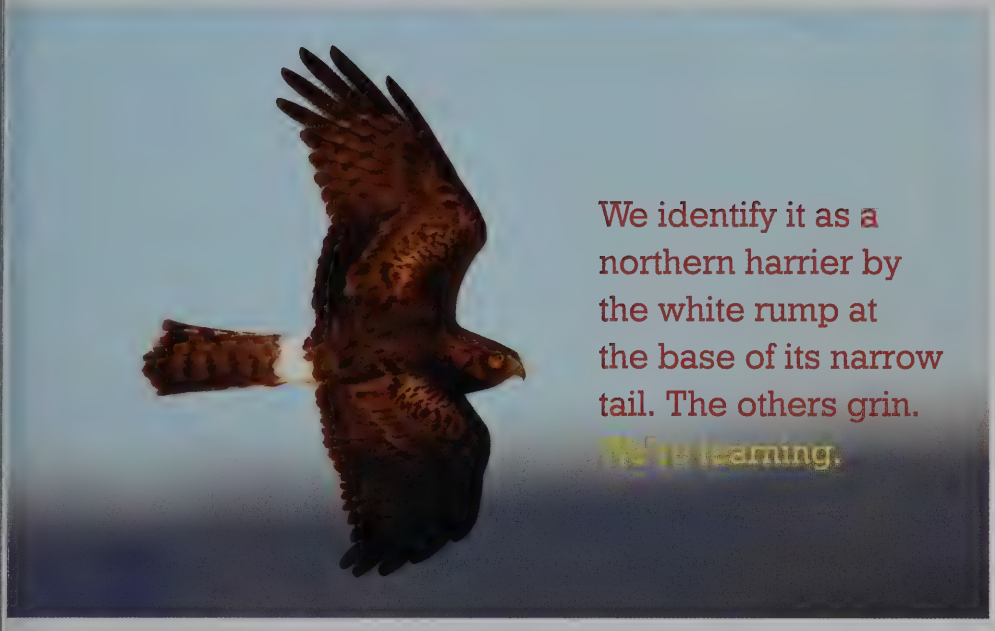
Raptor ID

Next we drive along country roads, crisscrossing the valley, the Tobacco Root Mountains rising to the southwest. Parker slows down whenever we see open water in a stream, river, ditch, or spring-fed pond. In a bush near one ditch he spots a tree sparrow, its russet cap distinguishing it from the abundant house sparrows also perched there. Rough-legged and red-tailed hawks soar over open pastures, the former looking for meadow voles and the latter for slightly larger prey such as cottontails. Parker points out that redtails this time



KEEPING TRACK Clockwise from below right: John Parker tallies birds on a chilly morning; Kathryn Hiestand examines owl pellets for clues as to what species they might have come from; at an evening debriefing session over cider and chicken chili, group leaders submit their tallies, which are then forwarded to a volunteer who produces a statewide summary. Biologists with Audubon, other avian conservation groups, and state and federal agencies use the information to assess the health of bird populations.

Tom Dickson is editor of Montana Outdoors.



of year usually have a darkish head, light undertail, and russet overtail, while rough-leggeds have a lighter head, a dark "wrist" or carpal, and a dark band toward the end of the undertail. Tolliver then spots a dark raptor soaring low over a meadow, and she and I identify it as a northern harrier by the white rump on the base of its narrow tail. The others grin. We're learning.

The group stops for lunch along the nearly frozen Jefferson River at the Williams Bridge Fishing Access Site. Two trumpeter swans—distinguishable from the nearly identical tundra swan by their French horn–like call—rise up from the river mist and fly off. As we eat our sandwiches, two adult bald eagles overhead take turns flipping over in midair and touching talons with the other. "It's a bit early for this type of mating activity, but I guess they're taking advantage of the nice weather," says Parker.

Then we start to see ducks, a few common goldeneyes but mostly mallards. Flock after flock, likely coming off stubble fields on nearby ranches, fly overhead. By day's end we'll have counted more than 1,300 mallards. I start wishing I'd brought my shotgun but keep my thoughts to myself. We're supposed to be counting birds, not shooting them.

Back on the road, Parker tells us the birds using water and denser vegetation on the lowlands are less active in the afternoon. Now we'll scan higher country for raptors and ground birds such as common redpolls, snow buntings, and horned larks. Sure enough, he soon spots a flock of roughly 50 horned larks. The birds land on a stubble field several hundred yards away and immediately vanish. "Once they are on the ground they're virtually impossible to see," Parker says. Over the next two hours we spot several juvenile bald eagles, two adult golden eagles, several roughleggeds, a dark-phase redtail, and a few hundred more mallards.

Heading back

At 4 p.m. we return to Willow Creek and make one last slow drive through town, spotting more common feeder birds. Then we hit a spring-fed pond teeming with waterfowl. Despite the low light, Parker identifies 11 species, many of them long gone from most other waters of Montana. In addition to those we'd already seen, he spots a lesser scaup, a greater scaup, tundra swans, a ring-neck, a canvasback, pintails, a Barrow's goldeneye, an American wigeon, and several gadwalls. I'd been out with hunters who knew their ducks, but I'd never seen a display of waterfowl identification like that.

By this time the five of us are chilled to the bone. Even though the thermometer stayed in the 30s most of the day, the wind made mittens, wool hats, and down jackets essential. I make a note to bring warmer boots next time—there's a lot of standing around on frozen dirt roads—and also a thermos of hot soup to go along with my sandwich.

By 5:15 p.m. we see warm lights coming through the windows of a home tucked into the woods along the Gallatin River. One of the volunteers has offered to host a post-count potluck. Vehicles converge on her driveway like chickadees to a feeder. Inside, we stand around the warm, humid kitchen ladling chicken chili and stew from crock-pots into mugs. We swap sightings and marvel over especially noteworthy sights, such as the Virginia rails one group spotted.

Parker sits off to the side to tally our group's sightings. We saw a total of 33 different species, he says, down a bit from the 40 to 45 he usually spots in the Willow Creek quadrant during the CBC.

I later learn that a total of 32 counts were held across Montana in 2014, with 671 observers in 250 field parties. The volunteers spotted a total of 229,442 individual birds and 139 species. Most abundant were mallards (52,989), Canada geese (39,147), and Bohemian waxwings (25,690). Among the more unusual species were two gyrfalcons, one Iceland gull, three snowy owls, one American pipit, and one turkey vulture.

Tolliver, the Illinois transplant, tells me over a cup of hot cider that she enjoyed the chance to see birding spots with others who like to watch wildlife. "I'm new to the area, so I was looking for something to do to meet fellow nature lovers and learn about birds around here," she says. "Everyone has been so welcoming, but I expected that. Birders are great people—gentle, serious, and funny at the same time. They're nice people to hang out with."

To find a CBC near you this holiday season, along with dates, contact information, and meeting sites, visit the Montana Audubon website mtaudubon.org and look for "Citizen Science" under the heading "Birds & Science."

PHOTOS PAGE 12: TOM DICKSON; PAGE 13: KEN ARCHER

STANDING UP FOR MONTANA

The state's effective approach to dealing with federal endangered species listing. By Tom Dickson

Two *Bozeman Chronicle* headlines this past August summed up Montana's successful strategy toward keeping species from being listed under the Endangered Species Act (ESA).

"Feds: Insufficient data to list wolverine as threatened" read one.

"Arctic grayling won't get federal protections" proclaimed the other.

Jeff Hagener, director of Montana Fish, Wildlife & Parks, says the decisions demonstrate the value of working cooperatively with the U.S. Fish & Wildlife Service. "They prove that FWP's approach is sensible and effective," he says.

Yet many Montanans disagree, believing FWP should do more to "stand up to the feds" and "show some backbone" whenever a species is listed or proposed for listing. An opinion piece earlier this year in the Billings-based *Western Ag Reporter* reflected a common viewpoint. "[FWP] has apparently slunk into the shadows and abdicated its authority to the U.S. Fish & Wildlife Service," the writer commented. "They once answered to the sportsmen and women of Montana. Now they dance to the tune of the feds."

Not true, says Hagener. "The notion that we're being jerked around on a chain is wrong," he says. "I've met with [USFWS director] Dan Ashe and made it clear that our proven conservation history shows that Montana is the best manager of Montana's wildlife." Hagener also told Ashe that listing species that are abundant in Montana but not in other states can be counterproductive. "One reason we have such healthy fish and wildlife populations and habitats is that Montana stockgrowers and other landowners have done a good job of stewardship," Hagener says. "But if a species gets listed anyway, they have less incentive to do the right thing, because they just end up getting punished for it."

Still, despite Montana's concerns with the ESA, "there's no escaping the fact that it's the law of the land, enforceable in all states, and the USFWS is responsible for upholding it," Hagener says.

Is FWP sensibly handling ESA requirements, as Hagener maintains? Or, as many Montanans are urging, should the department defy the USFWS and federal law?

POPULAR ACT

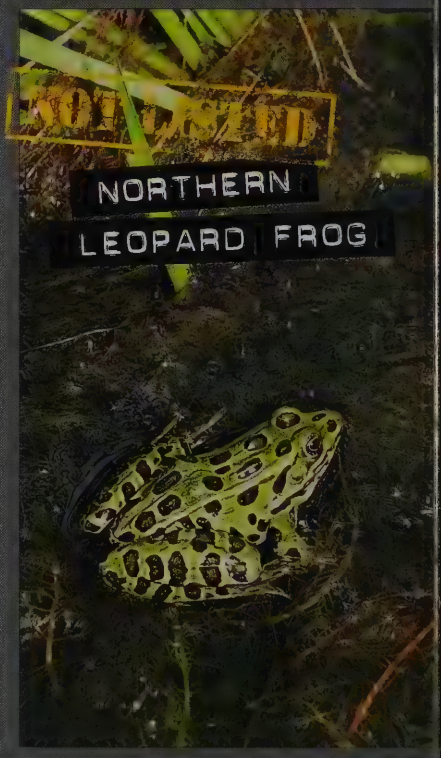
Congress passed the ESA in 1973 by a wide margin with strong bipartisan support. Though many property rights and corporate interests don't like the law, it remains popular with most Americans.

The USFWS is charged with carrying out provisions of the ESA, such as identifying species that may be candidates for listing. If the agency believes that threats to a species' population, range, or habitats may be grave enough to require ESA designation, it classifies the species as "warranted." "That's generally the first indication there's a serious problem," says Ken McDonald, head of the FWP Wildlife Division.

The USFWS also identifies what federal biologists consider to be the species' primary threats. "This indicates to states what the Service will be looking at most closely as it considers the possibility of listing," says McDonald. In the case of sage-grouse for instance, the federal agency's primary concerns

Tom Dickson is editor of Montana Outdoors.

STILL UNDER STATE CONTROL
By attending to federal concerns regarding habitat, populations, and management, Montana helped keep all of the species shown here off the endangered species list.



CLOCKWISE FROM TOP: STEVEN CNAM; JONNY ARMSTRONG /USGS; PAUL VECSE/ENGBRETSON UNDERWATER PHOTOGRAPHY; SHUTTERSTOCK

NOT LISTED
ARCTIC GRAYLING

NOT LISTED
WESTSLOPE
CUTTHROAT
TROUT

are sagebrush-grassland loss and fragmentation as well as a lack of state regulations to safeguard sage-grouse habitat in the future.

"The feds want to see legal mechanisms and regulations firmly in place so they can be assured a state is on the right track and is willing to do things on the ground to conserve the species," says McDonald.

Two examples of how the USFWS responds to the lack of assurances are its listing of the grizzly bear in 1975 and the Canada lynx in 2000. "The reason for both was that the states lacked adequate regulatory mechanisms to protect the species," McDonald says. "The USFWS wanted more than just promises. It wanted to see policies, conservation activities, and regulations in place to protect grizzlies and lynx over the long haul."

"We want to maintain state control, so we can manage species like wolves and grizzlies in balance with other wildlife. Once a species gets listed, the state loses that authority."

DOING WHAT'S NECESSARY

When Montana and other states address those concerns, the USFWS is much more likely not to list. That's what happened this past summer with the arctic grayling. The salmonid's last major stream-dwelling population in the Lower 48 lies in Montana's upper Big Hole River Valley. In August, federal officials said they were encouraged by a decade-long conservation program that encourages Big Hole landowners to voluntarily manage their property to remove threats to the grayling's coldwater habitat. "They wanted to see population trends increasing, genetic diversity, improved flows, and habitat improvements, and all of that happened," says Hagener.

Preventive conservation provisions can add to ranchers' busy workdays, "but it's generally a lot better than what they'd face if a species is listed," says Hagener. "It's like walking three miles a day and going on a diet. No one wants to do that, but it beats having a heart attack."

The same preventive conservation work helped keep the Yellowstone and westslope cutthroat trout off the threatened and endangered species list in the late 1990s, says Hagener. "With the ESA looming, Montana got ahead of the curve with some strong conservation efforts, and the USFWS decided that neither species warranted federal listing," he says. "As a result, anglers in Montana can still catch and keep cutthroat, and landowners have greater certainty about how they manage their lands."

FWP officials say the key to keeping species off the ESA list is to employ sound science and management. For instance, the department uses federal grants to conduct surveys of nongame wildlife populations suspected of declining. The work has paid dividends. "In part from our discovery that northern leopard frog populations in Montana were more robust than previously thought, the USFWS decided not to even consider that species as potentially endangered," McDonald says.

Trying to keep a species from being federally listed doesn't mean FWP is not concerned about it. "Just the opposite," says McDonald. "Montana's legacy of fish and wildlife conservation—and that includes good private land stewardship—has maintained strong populations that few states can match. We want to retain state control so we can continue to sustain healthy populations while managing species like wolves and grizzlies in balance with other wildlife. Once a species is listed, Montana loses that authority."

"TOUGH TALK" BACKFIRES

Despite Montana's success working cooperatively with the USFWS, many Montanans want the state to instead defy the federal agency. Some have called on county commissioners and the governor to insist that FWP, not the USFWS, should be the lead agency to carry out and enforce the ESA within Montana.

Because federal law makes clear that endangered species fall under federal jurisdiction, such demands can be counterproductive, say USFWS officials. "Chest thumping and rhetoric can make it tough for us to convince the courts and other federal agencies that a state is really serious [about conserving at-risk species]," says Mike Thabault, an assistant regional director with the USFWS. "We know that a lot of it is just bluster, but the general public often doesn't."

When it comes to endangered species, states should want to increase, not lessen, their conservation credibility in the eyes of the USFWS. Lacking assurances that states will enact appropriate conservation legislation, the federal agency is far more likely to protect a species by using ESA designation. Usually, that's the last thing a state wants.

NO WOLF HUNTING

For example, during the time when wolves were under federal protection, Montana lacked wolf management authority, hunting was banned, and depredation control on ranches was severely curtailed. The Canada lynx listing in 2000 has since halted timber harvest across much of western Montana. Were it to occur, the listing of sage-grouse, warns Hagener, would threaten activities in the bird's range connected to federal funding, including Farm Bill subsidies, CRP payments, and grazing leases on BLM land. "Many people don't understand how bad things could get," says Hagener. "If the sage-grouse is listed, we'd end up with the USFWS dictating farming, ranching, and oil and gas development across much of eastern and southwestern Montana."

Can't Montana defy the federal govern-

LEFT TO RIGHT: JUDY WANTLOCK; SHUTTERSTOCK

ment, as some state lawmakers have urged with their introduction of "nullification" bills? Wyoming tried that with gray wolves, going so far as to challenge, unsuccessfully, the Department of Interior in court. As a result, wolves remained under federal protection in Wyoming five years longer than in Montana and Idaho, both of which submitted wolf conservation plans that fully met federal requirements.

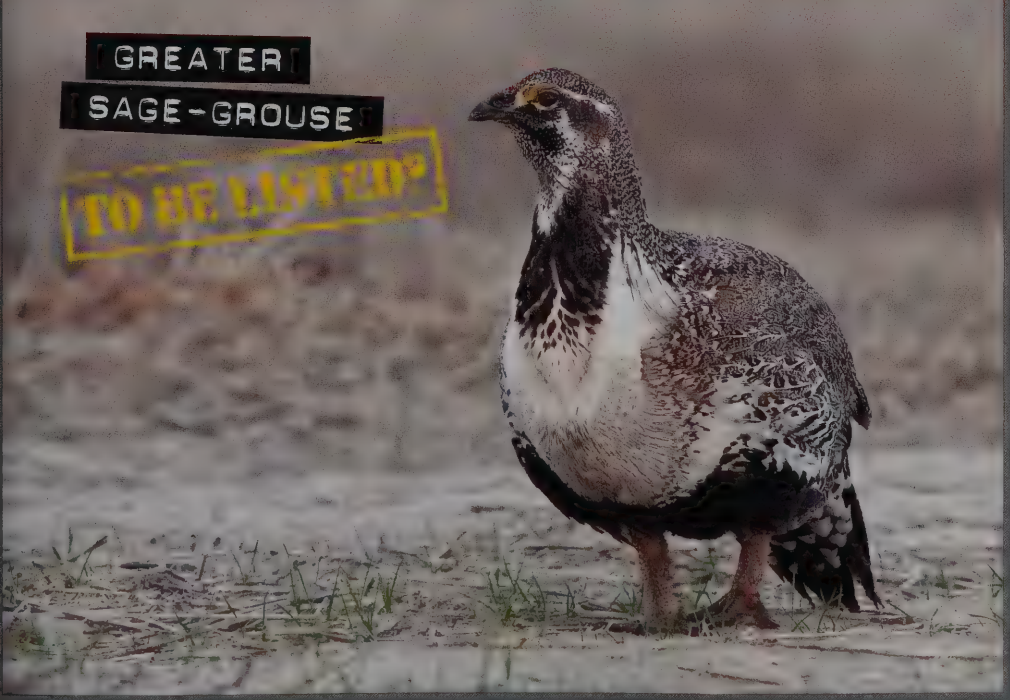
TAKING A STAND

None of this is to say that FWP won't challenge the USFWS when necessary. Recently the federal agency proposed listing the wolverine as threatened. Though the population was not considered in immediate danger, some biologists predicated that global warming would, decades from now, reduce late winter snowpack and affect wolverine denning and pup survival. FWP biologists and their counterparts in other western states maintained that "the science was too uncertain to justify listing," says McDonald, "especially at a time when the population in the northern Rockies is expanding and wolverines are everywhere they were when Lewis and Clark came through 200-plus years ago."

At the urging of eight western states, the USFWS convened a panel of 11 noted biologists, forest ecologists, and climate experts from across North America. After reviewing the study that linked future declining wolverine numbers to climate change, panel members concluded it was too speculative. So did USFWS officials. "Based on all the information available, we simply do not know enough about the ecology of the wolverine and when or how it will be affected by a changing climate to conclude at this time that it is likely to be in danger of extinction within the foreseeable future," announced Ashe in August.

The agency's decisions on the wolverine and, later, arctic grayling, demonstrates how science, conservation, cooperation, and sound management work more effectively than fiery rhetoric at keeping species off the ESA list, says Hagener. "We definitely stand up for Montana and Montana wildlife, but we do it in ways that actually work and don't defy the laws of the nation."

"We definitely stand for Montana and Montana wildlife, but we do it in ways that actually work and don't defy the laws of the nation."



MONTANA'S LIST

U.S. Fish & Wildlife Service Threatened, Endangered, and Candidate Species in Montana

ENDANGERED

Any species that is in danger of extinction throughout all or a significant portion of its range in the United States.

Black-footed ferret
Least tern
Whooping crane
Pallid sturgeon
White sturgeon

THREATENED

Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range in the U.S.

Grizzly bear
Piping plover
Water howellia
Bull trout
Spalding's campion
Canada lynx

CANDIDATE

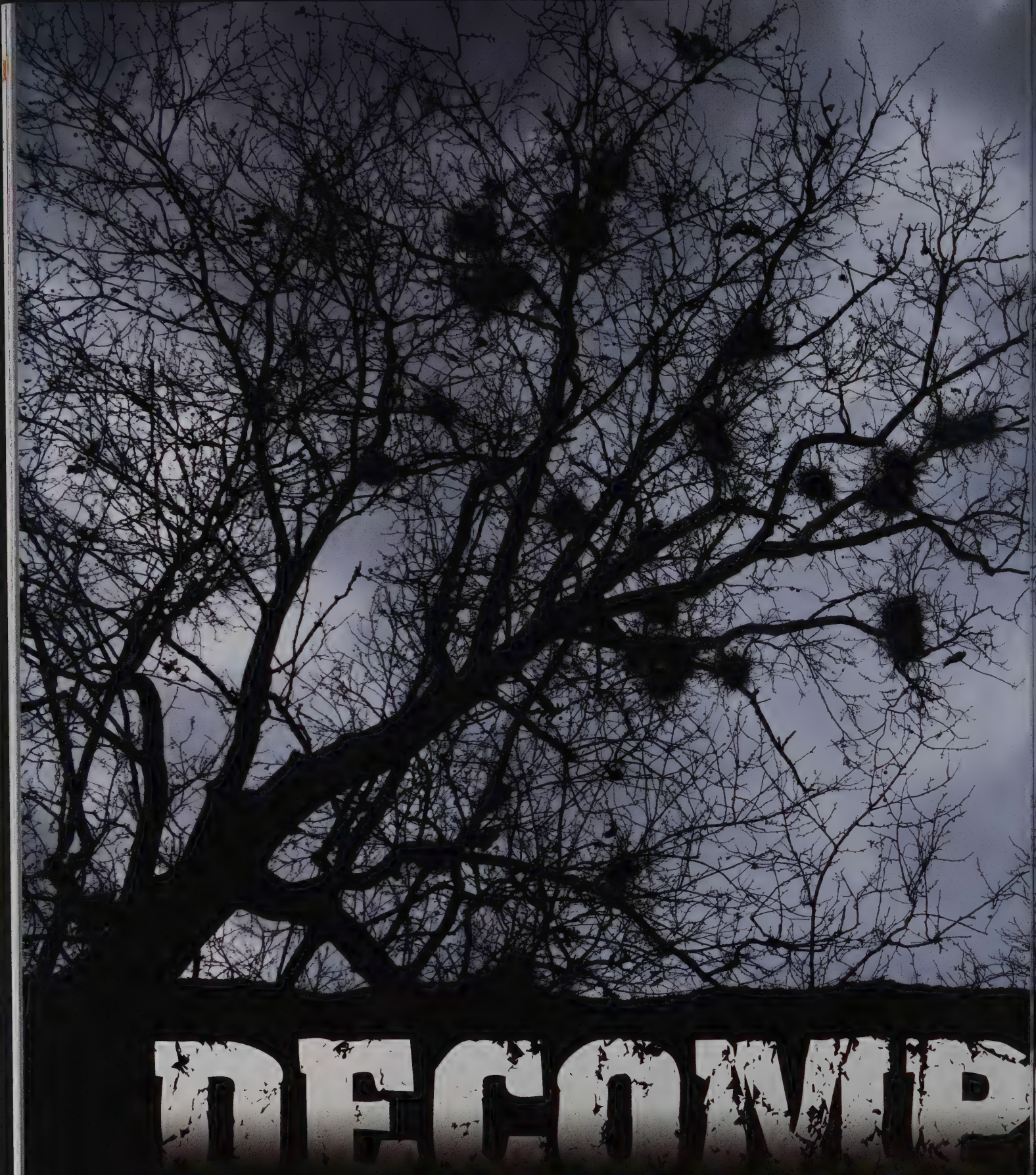
Species for which the USFWS has sufficient information on biological status and threats to propose to list them as threatened or endangered.

Whitebark pine
Sprague's pipit
Greater sage-grouse
Meltwater lednian stonefly

PROPOSED

Any species that is proposed in the Federal Register to be listed under section 4 of the Endangered Species Act.

Yellow-billed Cuckoo
Red knot
Northern long-eared bat



DECOMP

The remarkable wildlife activity that goe

Ten days after I'd seen the dead bull elk, a grizzly appeared and began to feed, its front paws and curved claws holding down a hindquarter as it tore in with its powerful jaws. The bear was an unforgettable sight—at this point the latest, and by far the largest, in a series of visiting scavengers, each playing a vital ecological role in recycling the mountain of elk carcass.

It was fall, and I was working as a caretaker for several cabins by the Yellowstone River not far from the town of Gardiner and the north entrance to Yellowstone National Park. My kitchen window looked out on the rocky slopes of the Gallatin Range, where one morning I'd spotted the elk carcass lying about a quarter mile away in a juniper-lined ravine. With a spotting scope I could see details: the tawny body, dark-haired shoulder mane, and, bent to the side, the head and antlers. The cause of the animal's death was not apparent—perhaps disease, age, or even injuries from sparring during the fall rut. Maybe a hunter had mortally wounded the bull but was unable to find it.

(Continued on page 22)

OSITION

into making an elk carcass disappear.

By Barbara Lee | Illustration by Liz Bradford

All-You-Ca

How scavengers—from g
fill their bellies while de

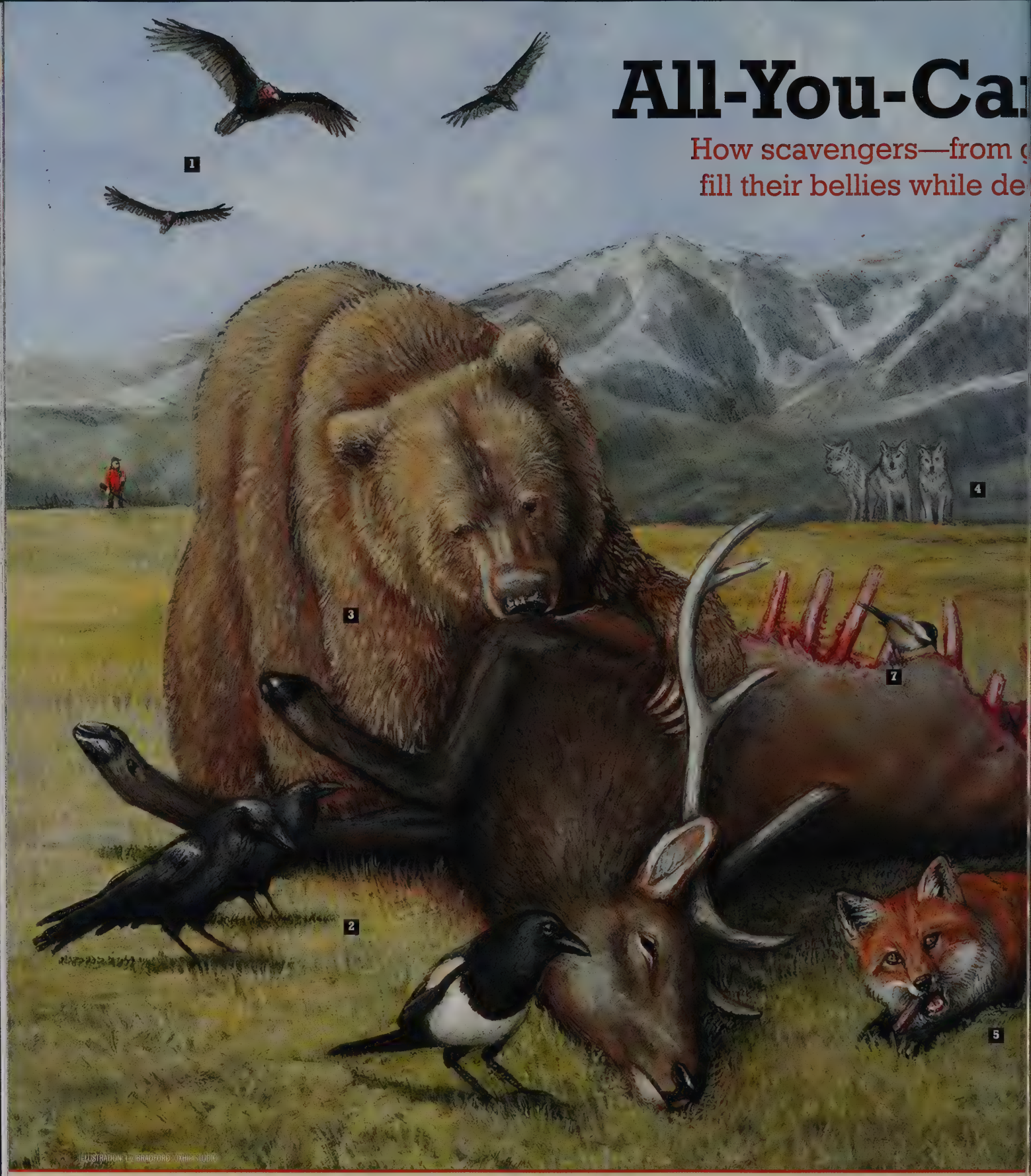


ILLUSTRATION: LIZ BRADFORD/OHIO STUDIO

An elk carcass can show up for many reasons: the animal died of starvation, old age, predation, or from a hunter who was unable to recover the animal in time. **1.** The first scavengers to arrive are turkey vultures, ravens, and magpies, which spot the carcass from the air. **2.** The birds are not strong enough to tear open the carcass, so they can only peck at the soft eyes and anus until larger scavengers show up. **3.** It takes the powerful jaws of a grizzly bear or gray wolf to tear through the elk's thick hide and expose the insides to other scavengers. **4.** Wolves will keep their distance until a grizzly eats its fill. **5.** Once the "buffet door" has been opened, smaller scavengers such as eagles, foxes, weasels, mice, and shrews can begin eating. None of the carcass goes to waste. **6.** Mountain bluebirds and other bird species may take tufts of elk hair to line their nests. **7.** Black-capped chickadees will peck

n-Eat Buffet

zzly bears to blowflies—
mposing an elk carcass

at scraps of fat left on the ribs. Wolves will break open thigh bones and eat the rich marrow inside. **8.** A coyote might find a broken bone and gnaw it for marrow, meat, and fat scraps. **9.** Blowflies alight on exposed body portions and lay eggs that hatch into maggots, which, along with carrion and dermestid beetles, feed on moist tissue. **10.** At a microscopic level, bacteria, fungi, and other "decomposers" further break down tissue. **11.** Even the antlers are consumed by porcupines and other rodents, who gnaw at the hardened bone to wear down their teeth. **12.** Bone dust, hair, and microbes enter and enrich the soil. In time the soil will grow plants such as bunchgrass that elk eat, thus completing the ecological cycle that began one day when a bull died in a field.

(Continued from page 19)

Curious about what would happen to the elk carcass, I began to read about scavengers. I learned that soon after an animal dies, bacteria already present in its body start the process of breaking down the flesh. This produces gas that gives off a putrid odor that attracts scavengers. The first to show up on this particular carcass were probably carrion (blow) flies. Dozens of species occur in North America, including the aptly named *Cynomya cadaverina* and *Calliphora vomitoria*. These shiny, blue-green insects immediately laid eggs and, about eight hours later, maggots hatched and set to work eating. Carrion beetles were most likely the next to appear and start feeding, mating, and laying eggs.

At dawn on the third day, I saw the first birds arrive—ravens and magpies. These, along with turkey vultures and other winged scavengers, generally can't consume much of an elk carcass in the first few days because they can't break through the thick hide. That's why they feed initially on carrion beetles and peck at the eyes and anus.

Ravens and magpies have keen eyesight and are constantly on the lookout for carcasses. Highly vocal, both communicate to other members about feeding opportunities. Other scavengers, in turn, keep an eye out for flocks of ravens and magpies as indicators that carrion is present.

During the early morning of day four, a pair of bald eagles and a pair of golden eagles appeared, probably after spotting the boisterous ravens and magpies. The eagles fed on the carcass at different times, the balds usually deferring to the slightly larger goldens. Though both raptor species are skilled hunters, neither will pass up an easy meal of dead elk, deer, or other large prey species.

I watched as each eagle worked on the carcass in the same way, using its talons and beak to try to rip a hole in the hide. Though these powerful raptors can tear into smaller carcasses such as jackrabbits

Barbara Lee is a writer who lives in Oregon. Liz Bradford is a science illustrator working in North Carolina.

OPENING THE BUFFET With their powerful jaws, scavengers such as bears and wolves open up a carcass, exposing the insides to smaller animals such as foxes, raptors, weasels, and shrews. The big animals also break down hide and bones into edible chunks for others at the carrion buffet.

On the morning of the tenth day, the grizzly showed up. It could have followed the stench from many miles away.

and even deer fawns, they weren't able to pierce the bull elk's thick skin. They and other scavengers often wait patiently for a large carnivore like a bear or wolf to open an elk, bison, or moose and reveal the meat and softer tissue inside. That was the case here, because by sundown the carcass remained unopened. The eagles and other birds would have to wait.

On day five, as the carcass was being worked over—for the most part fruitlessly—by the ravens, magpies, and eagles, a nervous-looking coyote trotted in from the brush. Coyotes often travel in pairs, and an equally skittish hunting partner soon joined its comrade. I'd heard a chorus of howling in the distance the night before. Maybe it was from these two or their kin, relaying news of the food discovery.

Usually coyotes aren't strong enough to open an elk carcass, but these two were. They took turns laboring to open the body, pushing against it with their front legs and pulling the hide mightily with their teeth. The following morning, I could see that the pair had succeeded and were feeding, likely on the elk's hindquarters and other meaty areas. They also lunged frequently at the scavenging birds, which were eager to finally feast on the elk's viscera.

This carried on for each of the next several days, with the coyotes continuing to break down the carcass and the birds feeding on scraps. Other scavengers that could have fed at the site were mountain lions, wolves, black bears, red foxes, pine martens, and weasels. A few wolverines live in the mountains nearby, and one of those powerful furbearers might have visited. Ordinarily turkey vultures would show up, but these avian scavengers had migrated south from Montana earlier in the fall.

On the morning of the tenth day, the grizzly showed up. Both black bears and grizzlies have an excellent sense of smell, and by that time the elk likely stunk to high heaven. The grizzly could have followed the stench from many miles away. It began consuming the dead elk, at times from a straddling position that looked like an embrace. My best guess was that it was trying to prevent other animals from taking over the prize. Biologists say that a bear may spend days alternating between eating a carcass and sleeping on it, but this one was gone the next day, having consumed pretty much all that was left of the elk.

By this time no scavengers were visible from my cabin window, and the spot under the junipers appeared quiet, even serene. After waiting another week, I decided it was time to hike over to take a look.

The soil, fertilized by nutrients from the carcass, would in time grow plants.

Was I ever wrong. Up close, the site was anything but serene. Though I saw only beetles and other insects, it was obvious that larger scavengers had been there recently. Most of the skeleton was still present, torn into three twisted pieces and draped in hide. Elk hair and animal tracks covered the muddy ground, and mounds of displaced earth indicated that chunks of the body may have been buried and then dug up not long before I arrived. A patch of snow revealed the fresh trail of something being dragged away, probably earlier that day.

Realizing I'd made a serious mistake, I left immediately. Montana Fish, Wildlife & Parks strongly warns people never to go near a carcass if bear or lion presence has been noticed. The large carnivores are highly possessive of their cache. In fall especially, grizzlies are hurriedly putting on calories in preparation for hibernation and will attack anything—or anyone—they consider a threat to their food. "This can be an extremely dangerous situation," one FWP official told me.

Though that was the last time I saw the elk remains, scavenger activity no doubt continued. Wolves, if they visited, cracked open bones for the marrow inside. Mice, shrews, and other small animals scavenged for tidbits of flesh and fat missed by larger animals. Flies, carrion beetles, and maggots stuck around until all tissue had been eaten or dried. Dermestid beetles then continued consuming hair, dried fat, and skin until nothing remained but the skeleton and antlers. Even those remnants eventually were whittled away by gnawing mice, porcupines, and other rodents. Bacteria, fungi, and other "decomposers" further broke down the remains into nutrients that, along with mineral dust from gnawed bones and antlers, washed into the soil with each rain. The nutrients (carbon and nitrogen) fertilized the soil and helped grow new plants, such as bunchgrass or forbs.

Someday an elk may wander past and feed on that vegetation. Thus an ecological cycle, begun with a dead bull elk carcass and made possible by countless scavengers, from the microscopic to the dangerously large, would be completed once again.

LEFT TO RIGHT: TONY BYNUM; SHUTTERSTOCK

Solving the Bitterroot

How biologists and local volunteers finally figured out what was reducing the popular Ravalli County elk population. **By Perry Backus**

In 2009 the southern Bitterroot Valley's elk herd—for years one of the state's most productive populations and a source of pride among local hunters—was in trouble.

The ratio between cows and calves in certain areas was below anything Montana Fish, Wildlife & Parks biologists had ever seen during nearly 50 years of conducting annual spring monitoring flights. In some hunting districts, the ratio was half that needed for the population to sustain itself. The worst declines were in the West Fork of the Bitterroot where, not long before, the elk herd had grown dramatically following massive wildfires in 2000 that created abundant grassland parks where the animals could forage. In 2005, the West Fork herd numbered close to 1,900. Four years later, it had dropped to just 774.

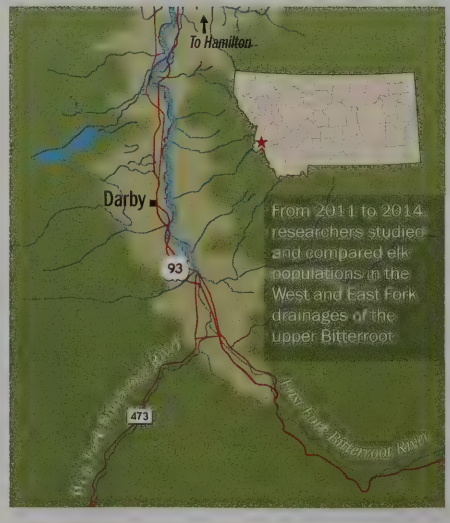
Local hunters, accustomed to seeing abundant elk, were shocked by the declines.

Even worse news came in 2009, when FWP biologist Craig Jourdonnais (since retired) found only 9 calves per 100 cows in the West Fork during his annual spring monitoring flight. A heavily hunted elk population that is also taking a hit from predators, like the one in the West Fork, needs a ratio of 30 calves per 100 cows to be sustainable, says Jourdonnais. He explains that the higher the ratio of calves to cows, the more likely a herd is growing or at least staying stable. Low ratios indicate a poor "year-class" (also known as a "cohort") of elk and signal a declining population. "We were seeing elk calf survival beginning to plummet throughout the Bitterroot," Jourdonnais says. "In the West Fork, it was plummeting on steroids. There were a lot of questions about why it was happening and we didn't have the answers. We could guess, but that's all we could do without a study."

Ideas surfaced from all quarters on what was causing the population free fall. Some pointed to the large cow elk harvest, carried out to lower the population as mandated by Montana statutes, in the years leading up to the crash. Others suspected that the cold and wet spring of 2009 had played a role in calf number declines.

But most local hunters thought they knew the reason. Wolves were a relative newcomer to the upper Bitterroot region and had been steadily increasing at the same time elk numbers were plummeting. The connection seemed obvious, as did the solution: Kill more wolves. "Probably 9 out of 10 people would have told you then that wolves were tipping the balance in the West Fork," Jourdonnais says. And that included Jourdonnais himself, as well as University of Montana researchers curious about the elk declines.

Every one of them was in for a surprise.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From 2011 to 2014, researchers studied and compared elk populations in the West and East Fork drainages of the upper Bitterroot
West Fork Bitterroot River
East Fork Bitterroot River

EAST VERSUS WEST

Following a groundswell of local support that included financial backing from Bitterroot hunters and conservation clubs, researchers from FWP and the University of Montana joined forces to develop a three-year study. The goal was to understand the relationship between predators and elk in the valley's southern reaches. Specifically, researchers wanted to figure out why calves weren't surviving as well as they should. Were they born especially weak due to nutritional deficiencies in the mother elk caused by inadequate habitat? Were predators—wolves as well as black bears and mountain lions—the culprits? Or was it some combination of those and other factors?

Researchers focused on comparing the widely differing herd dynamics and habitat conditions in the southern Bitterroot's East and West Fork areas. The East Fork had fewer wolves and, with less snowpack and more open winter range, was thought to contain better elk habitat. The steeper West Fork is more heavily timbered, receives more snow, and holds more wolves.

With the calf predation and habitat information, FWP wildlife managers hoped to figure out how to increase elk calf survival and thus the overall southern Bitterroot elk population. "But without reliable data on what the problem was, there was no way of devising a likely solution," says Justin Gude, head of FWP wildlife research. "All we had was diverse opinions."

The study began in February 2011, when researchers captured 44 cow elk—18 from the West Fork and 26 from the East Fork—and fit them with radio collars containing GPS units. The collars recorded each animal's location every two hours for about a year before automatically releasing so they

Journalist Perry Backus lives in the Bitterroot Valley.

MAP: LUKE DURAN/MONTANA OUTDOORS; PHOTO: CRAIG JOURDONNAIS/FWP

Elk Mystery

NEEDLE IN A HAYSTACK An FWP helicopter and ground crews were required to find newborn elk calves like this one in hundreds of square miles of the West and East Forks of the Bitterroot drainage. Once located, the calves were fitted with ear tags containing radio transmitters that biologists could follow to learn the animals' fate during the next 12 months.

could be collected and biologists could download the data. Roughly the same number of cows were collared in the two years that followed, for a total of 124 research elk.

The information gathered by the GPS collars provided biologists with solid information on where elk in the southern Bitterroot moved through the seasons. For instance, many people had believed that a significant portion of the West Fork herd migrated freely back and forth between Montana and Idaho's Salmon River watershed to the south. Yet in the entire three-year study, only four collared cows moved from the West Fork into Idaho, and they went west and northwest toward the Selway River watershed. This group included one cow that made her way over a 7,000-foot pass across the Bitterroot Divide.

In addition to tracking adult elk movements, researchers collected information on pregnancy rates and body fat levels to better understand cow body condition and reproductive performance. Biologists also studied the diet of elk in the study areas and the availability and abundance of various grasses and forbs (flowering plants) the animals eat during different times of the year. The goal: to learn what effect habitat has on elk health, especially during pregnancy.

The project, which cost $500,000, was funded in large part (more than 50 percent) by donations from individuals, local groups, national conservation organizations, and science agencies hoping to understand the cause of the Bitterroot elk declines.

> "Without reliable data on what the problem was, there was no way of devising a solution."

WHAT THEY FOUND

It turned out that habitat may be why East Fork elk produce more calves than those in the West Fork. FWP research biologist Kelly Proffitt, study co-leader, found that pregnancy rates in the East Fork varied across three years from 83 percent to 97 percent, averaging 90 percent, while rates in the West Fork, varying from 57 percent to 82 percent, averaged 73 percent and the elk there had far less body fat. "There may be some nutritional limitations in the West Fork herd preventing cow elk from accruing enough fat reserves to remain pregnant," Proffitt says.

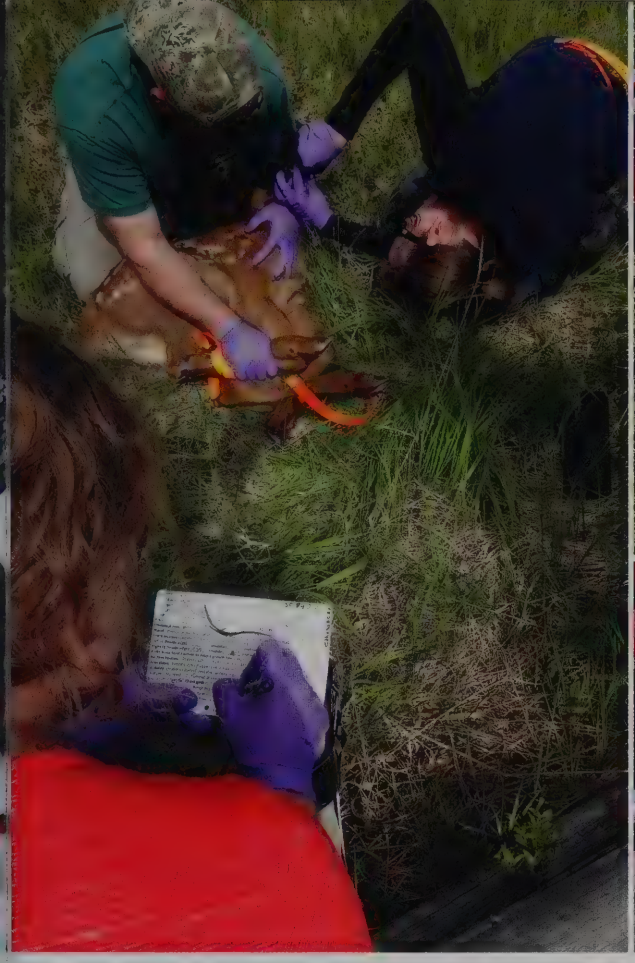
Even if a cow could produce a calf, there was a good chance the young elk wouldn't survive long. During the study, biologists placed ear tags containing tiny radio transmitters on a total of 286 newly born elk calves. They monitored the signals during each animal's first year. When the transmitter indicated that a calf had died (by a special signal that the young elk hadn't stirred in several hours), biologists raced to the site and investigated.

If they were able to arrive at the death scene before too many scavengers degraded evidence, they could identify the cause of death: natural causes such as starvation or freezing, human hunters, or predation by bears, wolves, or mountain lions.

Researchers learned that West Fork calves had about a 40 percent higher risk of mortality than East Fork calves. "This wasn't especially surprising because we knew going in that the West Fork was a harsher environment for elk," says Proffitt.

However, what did shock the scientists

ALL PHOTOS CRAIG JOHNSON/FWP



CATCH AND RELEASE Clockwise from facing page: Helicopter capture teams follow a herd in order to net, from the air, six-month-old calves; volunteers examine tooth eruption patterns in a newborn calf to estimate its age; volunteers release a calf after weighing, aging, and determining the animal's sex; an ear tag and ear tag applicator. The tags emitted a steady radio signal for an entire year. If a tagged calf remained stationary for more than six hours, indicating that it had died, its tag gave off a distinct double-pulse signal. Alerted to the fatality, biologists rushed to the site to investigate the cause.

was the makeup of calf mortality.

Figuring out which of the three large carnivores may have killed a calf required knowledge of the species' unique trademarks, explains Proffitt. A mountain lion often attacks prey from the front end, leaving deep wounds around the neck and jaw area. The carcass may show claw marks throughout the body. Mountain lions also tend to pluck all hair away from an area before they feed, and they often cache their kills. Bears usually kill with a crushing blow, cause more damage, and are far less tidy than lions. A wolf kill site, as one researcher described it, looks like a bomb has exploded, with bones and other body material scattered over a large area. Wolves also leave abundant tracks and scat.

> "Not to have even one confirmed wolf kill out of 36 confirmed elk calf fatalities is shocking to me."

Of the 171 calves in both study areas whose fates were documented (the 115 remaining calves had unknown fates primarily due to ear tag failures), 33 percent survived to age one and 67 percent were confirmed dead. When investigating the mortalities, researchers were surprised that 36 percent were killed by lions, compared to 5 percent by wolves (see pie chart on page 29 for other causes). "When we look at the number of elk calves that we can document were killed by wolves, the number is fairly insignificant," says project co-leader Mark Hebblewhite, a professor of wild ungulate habitat biology at the University of Montana. "For instance, we didn't have a single confirmed wolf kill this past year. Not to have even one out of 36 confirmed elk calf fatalities is shocking to me."

None of this is to say that wolves in the Bitterroot aren't eating elk. Researchers examined wolf scat and found that elk comprise 61 percent of the carnivores' diet. But because the number of Bitterroot wolves is relatively small when compared to the number of elk and lions, wolves aren't the large carnivore taking the biggest bite out of elk numbers; lions are.

Backers big and small

Financial support for the Bitterroot Elk Research Project came from

Ravalli County Fish & Wildlife Association
Montana Bowhunters Association
Hellgate Hunters & Anglers
Rocky Mountain Elk Foundation
Safari Club International Foundation
Western Montana Chapter of the Safari Club International
Pope and Young Club
Shikar-Safari Club International
McIntire-Stennis Foundation (USDA)
Montana Mapping & GPS
Montana Institute on Ecosystems
U.S. Forest Service (USFS)
Bitterroot and Beaverhead-Deerlodge Resource Advisory Councils (USFS)
University of Montana
NASA
onXmaps
MPG Ranch
National Science Foundation
Private donations from individuals in the community
Montana hunting and fishing license revenue and matching Federal Aid in Wildlife Restoration grants to FWP

100 years of elk conservation

Residents of the Bitterroot Valley have been volunteering to help their elk population for more than a century. According to an early article in the *Missoulian-Sentinel* (date unknown), the Stevensville Rod and Gun Club sponsored two rail shipments of 100 Yellowstone National Park elk in 1912. Wives of club members cooked and served community dinners to pay for the shipments. Local residents modified their horse-drawn wagons to transport the elk to the Burnt Fork drainage east of Stevensville.

The Ravalli County Fish & Wildlife Association and other local conservation groups continue to use fund-raising dinners to help pay for wildlife projects throughout the Bitterroot Valley, including the recent elk study.

Biologists say that elk calves radio-tagged over the last three years as part of the study could very well be direct descendants from those 1912 boxcar elk. Very few native elk existed in the Bitterroot during the early 1900s. The 1912 transplant augmented existing populations and started a new chapter in the Bitterroot wildlife conservation story. ■

—Craig Jourdonnais

Elk captured in Yellowstone National Park, at the time home to the continent's last herds, being released near Butte in the early 1900s. Similar transplant operations were conducted in the Bitterroot Valley.

Stepping up

by Craig Jourdonnais

Five years ago, the decline of elk in the southern Bitterroot was a complete mystery. Sure, many people thought they knew the reason, but there was no proof. Today we know a huge amount about that elk herd, its habitat, and the role of large carnivores. That's largely due to the dedication and contribution of local volunteers.

Professional wildlife biologists from FWP, the University of Montana, and federal agencies provided valuable leadership and scientific expertise for the capture teams. But research leaders Kelly Proffitt and Mark Hebblewhite needed help. They understood the importance of organizing dependable, disciplined, and experienced field teams for calf capture. So they sounded the call for citizen volunteers who had experience traveling through wild, rugged places in tough weather conditions.

Missoula high school student Hailey Jacobson, the author, and FWP warden Tyler Ramaker

Volunteers came from across Montana to help with the often grueling work. A calf capture field day might begin at 4 a.m. and last well into the night. Bedtime, if we didn't fall asleep at dinner, often came after midnight.

One volunteer was Hailey Jacobson, then a senior at Missoula's Hellgate High School, who loves competitive swimming and biology. Her interest in science has taken her to Costa Rica and the Baja peninsula, yet the experience of catching elk calves in her backyard of the upper Bitterroot topped anything she's ever done. "Being that close to new life, to a five-day-old elk calf, was incredible," she says. "Initially, I was very impatient. We would see a cow elk and just watch her. I wondered why we didn't go and find her calf. Then, as the day went on, I began to understand that it is more about observing and gaining information than just acting."

Another volunteer was Charlie Johnson, 67, a self-described "Bitterrooter" who trains for marathons by running 50 miles a week. He brought to the study decades of experience navigating wild places. He came away with renewed respect for the biologists and volunteers he worked with. "The long days and lack of sleep were demanding, but it didn't impede the professionalism and enthusiasm exhibited by the field staff," he says.

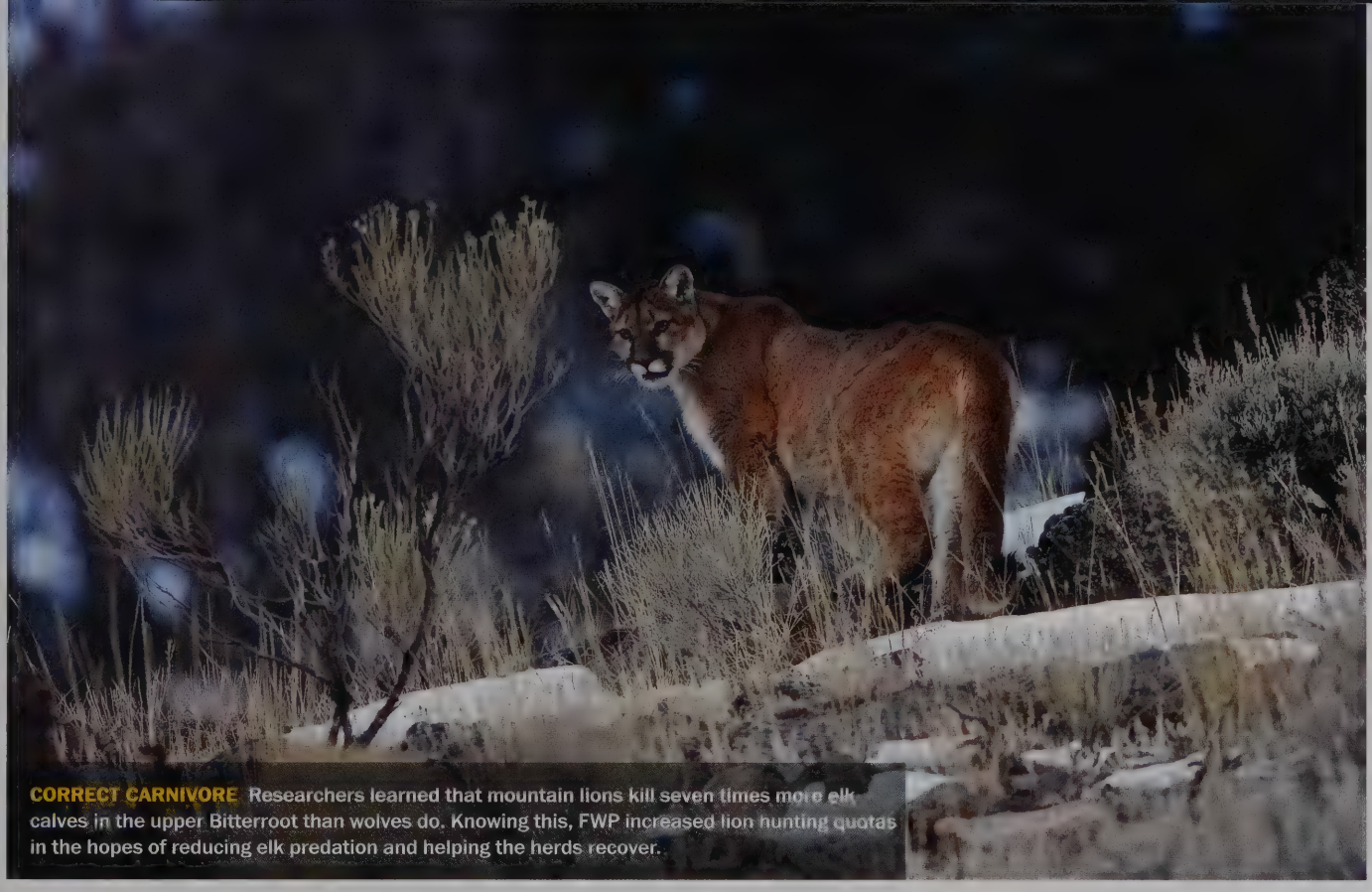
"Elk have provided me with a lifetime of memorable experiences and enjoyment," adds Johnson, a past president of the Montana Bowhunters Association. "It seems only fitting that I offer something in return. I only wish I could do more."

The 60-plus volunteers who helped with the study assisted in radio-tagging more than 200 calves from spring 2011 to spring 2013. Many told me they came away with an enhanced knowledge of the area's landscape, people, and wildlife management challenges. Equally important, their experience has made them "ambassadors" of the project. They can spread the word about wildlife management challenges in the Bitterroot and the importance of using rigorous scientific research to learn answers.

Bitterroot Valley residents have a passion for managing, conserving, and hunting their elk. Often lost in the debates over the return of large carnivores to Montana is the fact that these and other elk advocates across Montana helped restore the herds a century ago and still work on maintaining healthy populations. Montana would contain far fewer mountain lions, grizzly bears, and wolves if private landowners and local conservation clubs hadn't assisted in reestablishing the carnivores' abundant prey base and weren't continuing to help conserve it.

Of course, restoring large carnivores was not their objective. The motive was to bring back elk, a species many hoped to pursue someday with a gun, bow, or camera. Over the decades people like Hailey Jacobson, Charlie Johnson, and local ranchers, farmers, and hunters have chosen to participate in conservation work primarily for one reason: to leave a positive influence on their and other Montanans' way of life. ■

Craig Jourdonnais was the FWP Bitterroot area wildlife biologist when the study began. He now works as a wildlife biologist on the MPG Ranch near Florence.



CORRECT CARNIVORE Researchers learned that mountain lions kill seven times more elk calves in the upper Bitterroot than wolves do. Knowing this, FWP increased lion hunting quotas in the hopes of reducing elk predation and helping the herds recover.

MORE LIONS

Faced with this new knowledge, researchers wanted to learn how many mountain lions lived in the southern Bitterroot. To find out, the biologists used new population modeling techniques coupled with DNA sampling collected from live and hunter-harvested animals. They were surprised to learn there were far more lions in the area than previously thought. The upshot was that one possible way to boost overall elk calf survival would be to increase the number of lions that hunters could harvest. "This was a case where it's very clear that if FWP had initially listened only to popular opinion and killed a bunch of wolves, they would have done nothing but wasted time and money without doing anything for elk," Hebblewhite says.

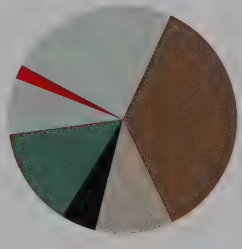
Ravalli County Fish & Wildlife Association president Tony Jones admits he was surprised. "Everyone assumed it was wolves, and I did too," he says. "It turns out that elk in the Bitterroot die for a lot of reasons. They drown in creeks, get hit by cars, and are killed by lions, bears, and wolves."

Jones says the study has helped him and others in the area better understand what has happened to the Bitterroot elk herd over the past 15 years. The West Fork elk herd peaked at nearly 2,000 animals in 2005 following years of relatively restrictive cow elk hunting seasons, heavy mountain lion harvest by hunters, and, at the time, few wolves in the area. But from there the population went downhill. Required by state statutes to lower elk numbers to more closely meet objectives outlined in the state's elk management plan, FWP responded by increasing cow harvest quotas. At the same time, concerns that lion numbers were dropping too low led FWP to cut back on lion harvest quotas so the population could rebound. Meanwhile, wolf numbers started rising. The combination of increased human and carnivore harvest was more than even the Bitterroot's once-robust elk population could sustain. "It was like the perfect storm," Jones says.

"People here were worried they might lose their elk herd, and that's why you saw them step forward," Jones adds. "It says a lot about how much folks in the Bitterroot care about elk. They wanted to know what was happening to their elk, and they were willing to reach into their pockets and help pay the bill."

Elk calf mortality

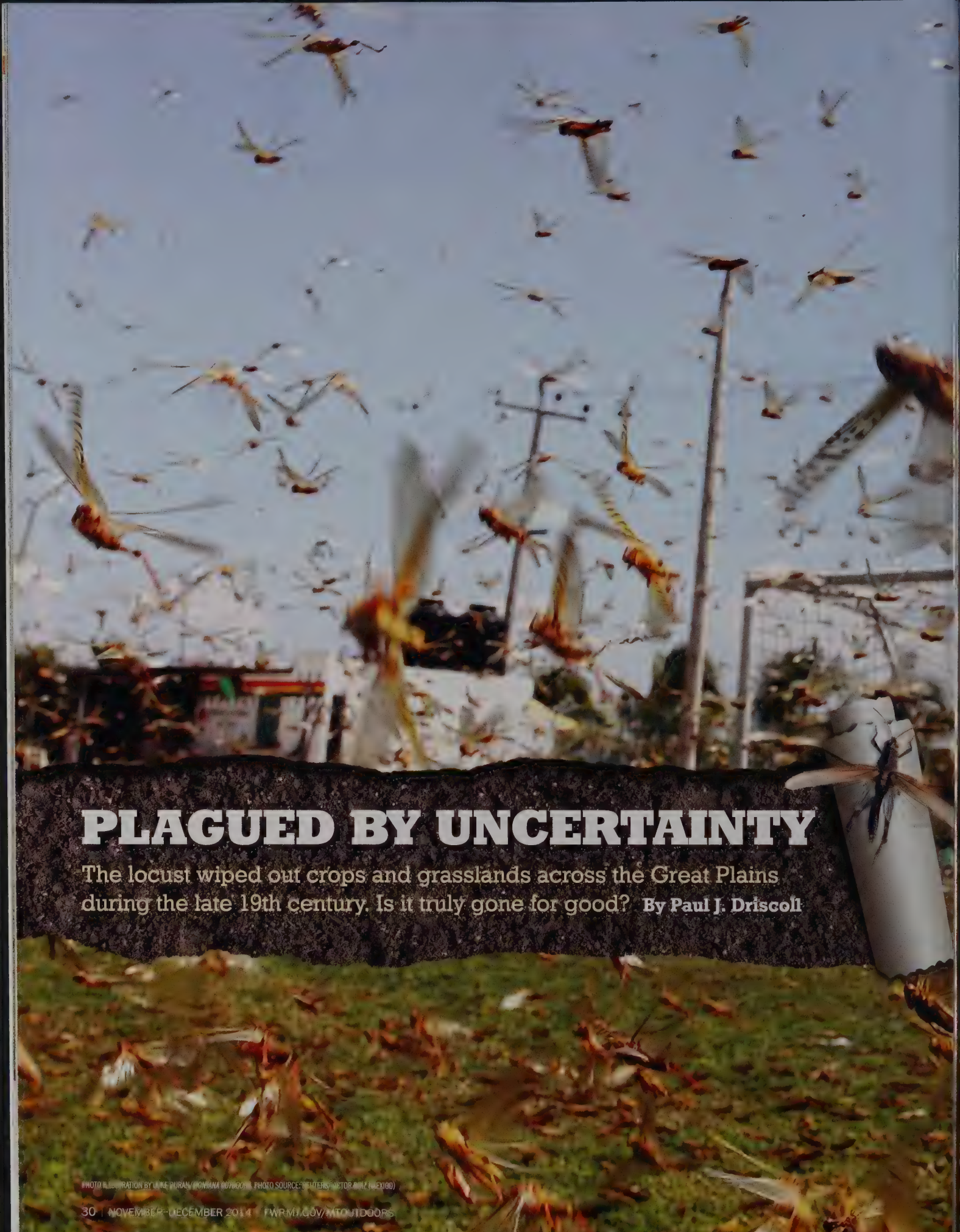
Bitterroot Elk Research Project results, 2014



- **36%** due to lion predation
- **24%** unknown causes
- **14%** unknown predation
- **11%** bear predation
- **8%** natural, non-predation causes
- **5%** wolf predation
- **2%** human-related causes (such as hunting and fence entanglement)

CREW CAPTAIN Ben Jimenez, FWP research technician, led the field teams throughout the three-year elk mortality study.

CLOCKWISE FROM TOP LEFT: FWP; MARK MILLER; CRAIG FOURDONNAIS/FWP; CRAIG FOURDONNAIS/FWP



PLAGUED BY UNCERTAINTY

The locust wiped out crops and grasslands across the Great Plains during the late 19th century. Is it truly gone for good? **By Paul J. Driscoll**

PHOTO ILLUSTRATION BY LUIS PURAS/MONTANA OUTDOOR. PHOTO SOURCE: REUTERS/VICTOR RUIZ (MEXICO)

LOCUST MOTION A modern-day swarm of locusts, likely a species that flew north from Central America, descends on Cancún, Mexico, in 2006. Of the thousands of grasshopper species worldwide, only a dozen can transform into the swarming, voracious locust form. Montana's last infestation came in the late 1800s.

Contrary to what many people believe, the herbivore that consumes the most vegetation on much of the Western landscape is not cattle or sheep, or elk, deer, or antelope. It's the grasshopper.

If that seems surprising, consider that just 150 years ago infestations of a form of swarming, migrating grasshopper known as the Rocky Mountain locust were so severe that almost all vegetation over entire regions was stripped bare. Among the most iconic images of the late 19th-century American West are skies filled with flying locusts descending on pioneer farm families. Row crops, vegetable gardens, horse blankets, and even clothes left on the line were devoured. The horde then lifted off and moved downwind to invade the next hapless community.

Newspapers and prairie journals documented the plagues, which could stretch across the arid West well into the Midwest. A locust swarm in the vicinity of Helena "came in from the north...striking the buildings on the south side of the street, and fell down in such large numbers as to form drifts of hoppers," reads an 1868 account from *The Third Report of the United States Entomological Commission*. One Helenan told a commission representative there were so many locusts that, while driving oxen, he "couldn't see the front yoke."

Such outbreaks could stretch 1,000 miles to the east. Laura Ingalls Wilder, author of *On the Banks of Plum Creek*, wrote about locusts wiping out her family's crops. "A cloud was over the sun," she wrote in 1937, looking back upon her girlhood in Minnesota during the mid-1870s. "The cloud was hailing grasshoppers. The cloud *was* grasshoppers."

A perfect storm of the 1.3-inch-long Rocky Mountain locust (*Melanoplus spretus*) in 1874 is believed to be the largest mass of living insect matter ever witnessed by modern man. Tracked by telegraph, the main flight of that plague measured 110 miles wide and 1,800 miles long, stretching from the southern Canadian plains to the north Texas border, moving easterly toward the Mississippi River on prevailing winds. Periodic outbreaks of locusts on the Great Plains were a major obstacle to agrarian settlement of the prairie in the mid- to late 19th century.

Though it devastated an entire generation of American farmers, ranchers, and pioneers, the Rocky Mountain locust most likely remains today only as a cultural relic. Within 30 years of the 1874 flight, the species had vanished from the North American landscape. The last documented living specimens were observed and collected in southwestern Manitoba, in 1902.

Actual photo of Rocky Mountain grasshoppers (locust form), *Melanoplus spretus*, c. 1870s.

PHOTOS: WIKIPEDIA

Other locust species endure, however. The cradle of agriculture and civilization along the Tigris and Euphrates Rivers in the Middle East is still occasionally visited by flying swarms. Just last year, Egyptian farmers burned tires to divert African desert locusts blown in from the Sudan. Israel was similarly plagued by this species of locust that dates to biblical times.

Yet the Rocky Mountain locust is very likely extinct, perhaps never again to consume a single stalk of wheat. North America has joined Antarctica as the only continent with no resident grasshoppers that take the locust form.

How did that extinction happen? And, even more compelling, has the Rocky Mountain locust truly disappeared?

BAFFLING DISAPPEARANCE

All locusts are grasshoppers, but not all grasshoppers are locusts. Grasshoppers naturally progress through growth phases. Locusts are the ultimate phase of certain grasshopper species that alter their shape, color, and behavior in response to crowded conditions and ecological stresses. Of the 8,000 species of grasshoppers throughout the world, only about 12 are known to become swarm-forming locusts. The Rocky Mountain locust was this form of a grasshopper species native to mountain valleys along both sides of the Continental Divide. When stressed by food shortages and drought, these grasshoppers would change into a climax version of themselves, emerging as locusts with elongated wings needed to travel far from native ranges. Though capable of reproducing elsewhere, the locusts could not survive more than a few seasons outside their native range.

Over the past century, the disappearance of the Rocky Mountain locust—or, more precisely, the locust form of the Rocky Mountain grasshopper—has baffled entomologists and ecologists. The collapse came before the advent of synthetic insecticides

such as DDT and happened within an evolutionary blink of an eye.

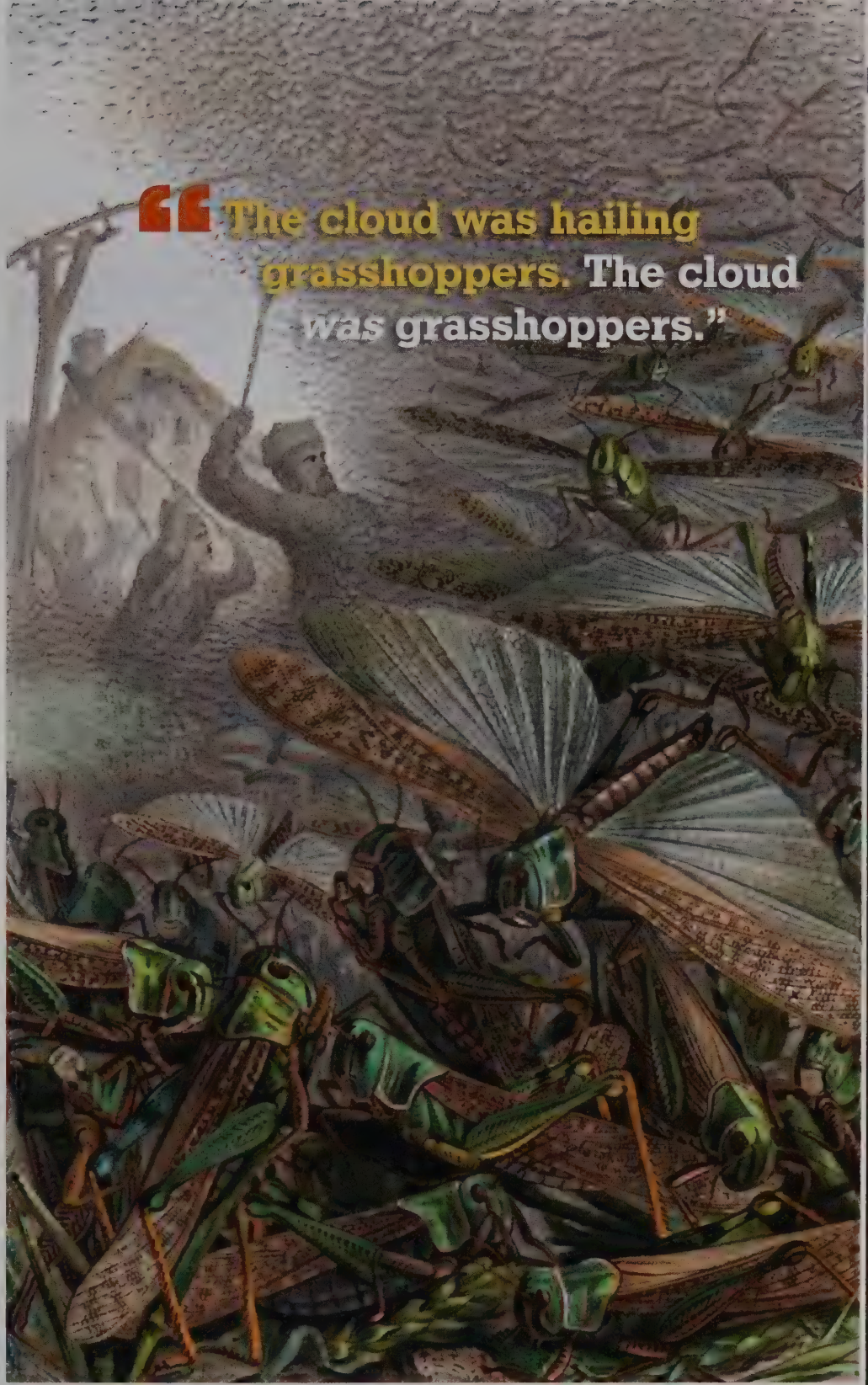
Jeffrey Lockwood, author of *Locust* and previously an entomologist at the University of Wyoming (where he is now a professor of philosophy), has formulated the most widely accepted explanation. Between major locust outbreaks, he says, the Rocky Mountain locust population would naturally shrink drastically to as little as one-millionth the size of its peak. These insects concentrated in just a few hundred square miles of mountain river valleys, awaiting the next drought or other ecological stressor that would cause numbers to swell again and the insects to swarm. It was from the Rockies that locusts swept across the Great Plains skies into the Upper Midwest to plague Laura Ingalls Wilder's family and neighbors.

As settlers moved West in the late 19th century, these mountain valleys filled with foraging cattle and sheep, while irrigated crops such as alfalfa supplanted native grasses in the bottomlands. Grasshopper egg clusters buried in shallow soils were trampled by livestock, flooded by summer irrigation, and plowed under. Lockwood's theory holds that this coincidental convergence of pioneer agriculture with a vulnerable locust population spread thin among mountain valleys caused *M. spretus* to become extinct.

His theory holds that the coincidental convergence of pioneer agriculture with a vulnerable locust population spread thin among the mountain valleys caused *M. spretus* to become extinct.

People in the early 1900s were understandably late to grasp the possibility that the Rocky Mountain locust might be gone for good. Because major outbreaks generally occurred every 8 to 12 years, long periods without a regional sighting were not unusual. And when it came to the premier pest of the continent's midsection, out of sight was out of mind. Besides, other grasshoppers emerged to cause problems on rangelands and farm fields, particularly during the drought years of the 1930s. Though not as devastating as locust outbreaks, these infestations were severe enough that a new generation of ranchers and farmers could hardly imagine anything worse.

It wasn't until the mid-20th century that scientists began to wonder why the Rocky



VILLAGE MENACE *Swarm of Locusts*, by Alfred Brehm, 1884, depicts an infestation in Germany. A similar outbreak that devastated American pioneers during the late 19th century was popularized by Laura Ingalls Wilder in *On the Banks of Plum Creek*.

Mountain locust had yet to return. Many entomologists believed that the locust was a particularly gregarious and nomadic form of a common grasshopper—*M. sanguinipes*—also known as the lesser migratory grasshopper. As environmental conditions once again became optimal, they suspected that this familiar grasshopper would transform, like Dr. Jekyll becoming Mr. Hyde, into the crop-devastating locust of old.

Approximate locust swarm coverage, 1876
In 1874, an even larger outbreak occurred. Estimates put the total number of insects at 12.5 trillion, making it possibly the world's largest animal mass in recorded history.
Rocky Mountain locust specimen

The only way to know for certain if the locusts of the late 1800s were in fact a form of *M. sanguinipes* would be to compare DNA. That science did not exist until the mid-1980s, when Lockwood and colleagues from the University of Wyoming began to look to molecular analysis to unlock some of the mysteries surrounding the disappearance of the Rocky Mountain locust. Finding samples to study was among their biggest challenges. Although once estimated to occur in the trillions, fewer than 500 professionally preserved specimens remain in university and government collections. Most are dried and mounted and lack sufficient tissue for DNA analysis. So Lockwood and his associates turned to the "grasshopper glaciers" in the hope of finding fully preserved specimens. These ice fields, which contain frozen bodies of long-dead locusts and other insects that fell from the skies hundreds of years ago, persist along the most remote upper stretches of the northern Continental Divide.

The researchers first tried Grasshopper Glacier—named by visitors in the early 1900s who observed frozen insects imbedded in the ice—in Montana's Beartooth Mountains. Unfortunately, the glacier had melted so much that old grasshoppers existed only in fragments too small to identify and sample for DNA analysis. After several other false starts, Lockwood finally found, in 1999, whole locusts at Knife Point Glacier in Wyoming's Wind River Range. Over several visits, the crew collected several fully intact specimens and submitted them, along with specimens of currently existing lesser migratory grasshoppers, to a laboratory for analysis.

Carbon dating showed that the locusts were about 400 years old. DNA analysis concluded that the locusts were not a phase of the common lesser migratory grasshopper, as once thought, but a phase of a different grasshopper species entirely—the Rocky Mountain grasshopper. So a new question emerged: Is the Rocky Mountain grasshopper and its locust form truly extinct? And what would happen if this species were discovered, alive, somewhere out there?

Though unlikely after more than a century of its disappearance, a rediscovery of the Rocky Mountain locust could create several problems. Lockwood compares the possibility to current debate over the smallpox virus. Once a deadly scourge the world over, the smallpox virus exists today only in a handful of secure laboratories, such as the Centers for Disease Control and Prevention. Occasionally, calls arise to destroy the remaining virus samples to keep them from falling into the hands of terrorists. Yet many epidemiologists insist the samples be preserved for future vaccine research.

If Rocky Mountain locusts were to be found in hiding, a similar argument would no doubt take place between those wishing to preserve the colonies for scientific research and those demanding the insects' immediate and total annihilation.

WAITING IN THE WINGS?

The possibility of such a discovery is not entirely far fetched. One of the world's most respected grasshopper experts believes that the Rocky Mountain grasshopper may not be extinct after all. He maintains that the species could be living in remote mountain valleys, hardly distinguishable from common grasshoppers.

Daniel Otte, senior curator at the Academy of Natural Sciences at Drexel University in Philadelphia, is a world famous insect expert. He has discovered and named roughly 1,600 species of invertebrates and is the author of a two-volume atlas, *The North American Grasshoppers*, published by Harvard University.

In a series of interviews, Otte told me he thinks some basic element of North American agriculture beginning in the late 19th century may have interrupted one or more of the series of environmental pressures that

LOCKED IN ICE Right: Jeffrey Lockwood was the first to uncover intact Rocky Mountain locusts from Knife Point Glacier, shown here. Below, a 400-year-old specimen that Lockwood recovered from the ice field.

Paul J. Driscoll is a public information officer at the Montana Department of Environmental Quality.

CLOCKWISE FROM TOP: MAP GRAPHIC BY LUKE DURAN/*MONTANA OUTDOORS*. SOURCE: U.S. ENTOMOLOGICAL SOCIETY; SCOTT P. SCHELL, UNIVERSITY OF WYOMING; WIKIPEDIA; SHUTTERSTOCK; JEFFREY LOCKWOOD, UNIVERSITY OF WYOMING; SCOTT P. SCHELL, UNIVERSITY OF WYOMING

apparently trigger a final transformation of grasshoppers into locusts. He believes that grasshoppers with locust form potential, like *M. spretus*, could very well survive indefinitely, conveniently hidden among common grasshoppers. He pointed out that the famous African desert locust often exists over decades, and over hundreds of insect generations, as a secretive, largely solitary, and agriculturally benign grasshopper. As pressures from prolonged drought and lack of food build over several generations, those grasshoppers eventually transform into full-blown nomadic locusts. The behaviors of the Rocky Mountain locust may have been similar. "I can't believe *M. spretus* is extinct," Otte said. "But where to look for it?"

One of the world's most respected grasshopper experts believes that the Rocky Mountain grasshopper may not be extinct.

BIDING ITS TIME? A preserved specimen of the likely extinct Rocky Mountain locust. Note the elongated wings characteristic of the locust form. Some scientists believe that grasshoppers able to turn into locusts may still remain in remote valleys of the Rocky Mountains. If so, most people would hope those swarming insects stay put, never to plague us again.

Because different grasshopper species are difficult to distinguish in the field, the Rocky Mountain locust could remain hidden among the abundant common lesser migratory grasshopper. One way to find out, said Otte, would be to conduct an extensive survey in likely grasshopper locales across the Rocky Mountains. DNA collected from those grasshoppers could be compared to that in locusts taken from glacial samples.

Whether or not the Rocky Mountain locust remains in the mix, North American grasshoppers are tough insects. They have somehow endured repeated ice ages—not to mention today's powerful insecticides and crops genetically manipulated to thwart pests. Though highly unlikely, it's possible that one grasshopper species with the potential to transform into locusts is still out there, waiting for the right conditions to return.

Grasshoppers and rangeland

U.S. Department of Agriculture agencies have been charged with controlling grasshopper infestations on federal rangeland since 1934. While protecting rangeland in the short term, that work has proved expensive and environmentally harmful. Early hopper controls focused on poisoning grain and other baits. By the 1960s lower-volume applications (less than one-half gallon per acre) of insecticides such as malathion and later carbaryl became the main control methods. Yet even at those levels, the federal Animal and Plant Health Inspection Service (APHIS) cites potential harm to birds and aquatic animals. Sage-grouse are of particular concern. Today, only spot applications are recommended.

Roughly 120 grasshopper species are found in Wyoming and Montana, and many still ravage vegetation. According to APHIS, nearly a quarter of rangeland may be devoured by grasshoppers during outbreaks. Some species specialize on grasses, others on forbs (broad-leaved flowering plants), and others eat a mix throughout different phases of their life. Six or seven species take a major toll on croplands.

The lesser migratory grasshopper (*M. sanguinipes*) is the dominant species over most western rangelands. Major outbreaks of these hoppers occur naturally from time to time, often in response to drought.

Though grasshopper infestations often damage agriculture and farmers' bottom lines, they may be an asset to range health and ranching economics over the long haul, say grasshopper expert Jeffrey Lockwood and APHIS officials. Without question the insects compete with cattle and even wildlife in some years. However, like that of any plant eater, grasshopper excrement is high in nitrogen, which boosts productivity of certain rangeland plants. During outbreaks, hoppers fly more and farther, spreading nitrogen in both their excrement and their bodies as they die after a killer frost. "It's an economic problem versus an ecologic one," says Lockwood. He notes that while most people can afford to take the long-term view of grasshoppers and rangeland health, "unfortunately for ranchers, they have to deal with the short-term economic reality."

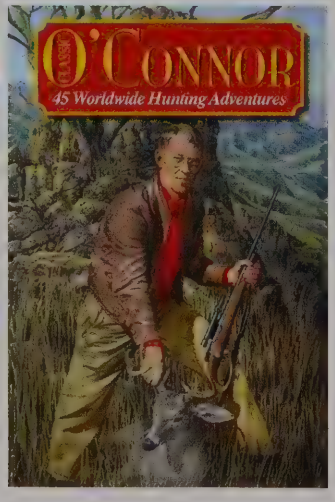
Common grasshoppers add nitrogen to soil, improving rangeland vegetation productivity over time. Yet they also compete with cattle and wildlife for grass during the short term.

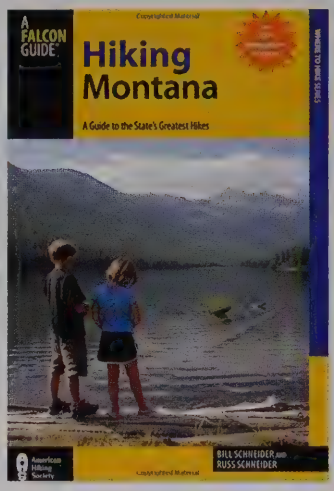
By Tom Dickson

Classic O'Connor: 45 Worldwide Hunting Adventures

Jack O'Connor. Skyhorse Publishing. 400 pp. $35

Anyone 60 or older who loved to hunt as a kid likely grew up reading stories by Jack O'Connor. The shooting editor for *Outdoor Life* from 1942 to 1972, O'Connor was one of the world's most knowledgeable rifle experts and did more to champion the .270 Win. cartridge than anyone (though he was nearly as partial to the .30-06). He was also remarkably prolific, writing more than 1,200 articles over his career for publications ranging from *Redbook* to *Esquire*. Many of his sporting articles, which in addition to *Outdoor Life* appeared in *Field & Stream* and *Sports Afield*, have been compiled as books, including *The Lost Classics of Jack O'Connor*, edited by Jim Casada. This new book picks up where *Lost Classics* left off, presenting 45 stories never before published in book form. The book includes a 16-page section featuring photographs of O'Connor and his family, a remembrance from his son Jack Bradford, and a glowing tribute by his longtime friend, conservation writer John Madson. ■





Hiking Montana: A Guide to the State's Greatest Hikes

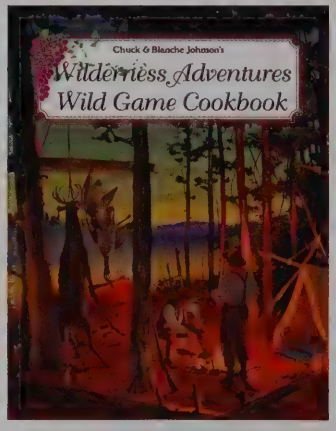
Bill Schneider and Russ Schneider. Globe Pequot Press. 480 pp. $24.95

The best hiking guidebook ever written just got better. Falcon Guides recently reissued the 35th anniversary edition of Bill and Russ Schneider's indispensable guide to top hiking routes across the western half of Big Sky Country. This popular book—in its tenth printing, having sold roughly 100,000 copies since 1979—is so intelligently organized it's hard to believe all other outdoor recreation guides don't steal the format. In addition to detailed information on the 110 hikes—including difficulty rating, elevation map, route map, trailhead directions, route description, fishing information, and more—the Schneiders break down the hikes into categories such as hikes near Montana's largest towns, easiest day hikes, best hikes for backpacking (short and easy, intermediate, and extended), hikes for spring, hikes with waterfalls, and hikes for people who do (and don't) want to see grizzly bears. Like with all Falcon Guides, this one rates hills in six categories, ranging from slight upgrades to "H" (for "horrible"). As has been the case from its initial publication, the ultimate intent of this father (Bill) and son writing team is to introduce more people to the backcountry so they become advocates for its conservation. ■

Wilderness Adventures Wild Game Cookbook

Chuck Johnson and Blanche Johnson. Wilderness Adventures Press. 301 pp. $24.95

We regularly receive game cookbooks here at the office. Sadly, few offer recipes we haven't seen before. Here's an exception. Chuck and Blanche Johnson of Belgrade know both game and cuisine. There's no tired Pheasants in Cream of Mushroom Soup in this collection of 200 carefully crafted recipes for upland birds, waterfowl, small game, and venison. Anyone who's been reading *Montana Outdoors* over the past few years knows I'm an advocate of exotic flavors to make game dishes stand out from the ordinary, and the Johnsons don't disappoint. Their Spanish-Style Sharptail with Pomegranate Glaze,



Chukar with Orange and Paprika Sauce, and Calvados-Marinated Duck Breasts all looked delicious. I tried the Sautéed Grouse with Peach Beurre Blanc Sauce with a blue grouse and enjoyed every bite. Each dish includes a knowledgeable wine pairing that makes me wonder if the authors don't have the largest wine cellar in all of Gallatin County. ■

Birding Trails Montana

Chuck Robbins. Wilderness Adventures Press. 400 pp. $29.95

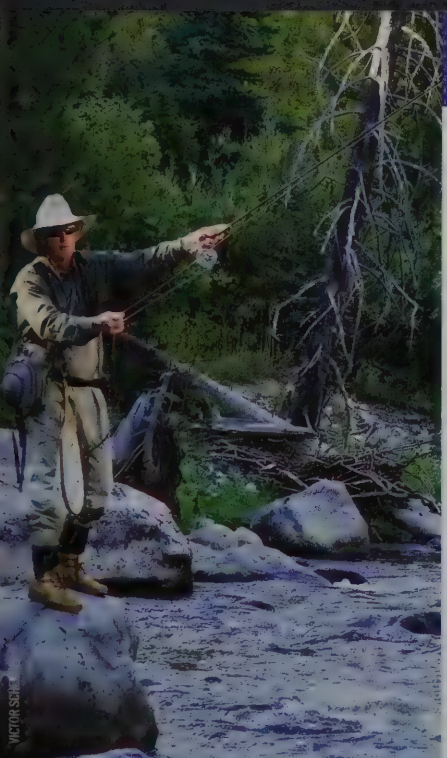
This wonderful birding resource details 240 prime locations across Montana. Photographer and writer Chuck Robbins has compiled the ultimate guide on where to go in our big state to have the best chances of seeing many birds, abundant diversity, and uncommon or rare species.

Featured sites include federal waterfowl production areas and national wildlife refuges; state wildlife management areas, parks, and fishing access sites; county and local parks; and numerous roads, recreation areas, ponds, and other bird-attracting sites. The guidebook includes detailed maps, contact information, best seasons, key birds, and even GPS coordinates. ■

The Hidden Life of Wolves

Jim Dutcher and Jamie Dutcher. National Geographic. 216 pp. $25

In 1991, Emmy-award-winning documentary filmmaker Jim Dutcher and his wife, Jamie, began raising wolf cubs, procured from wildlife rescue centers, in a 25-acre enclosure in Idaho's



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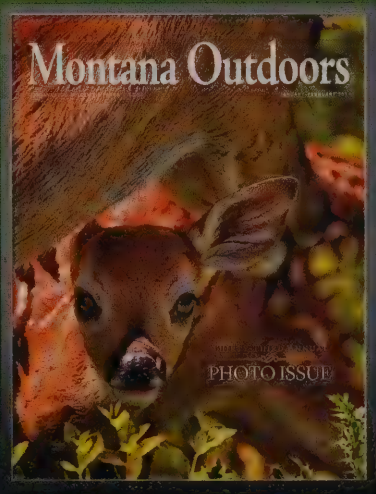

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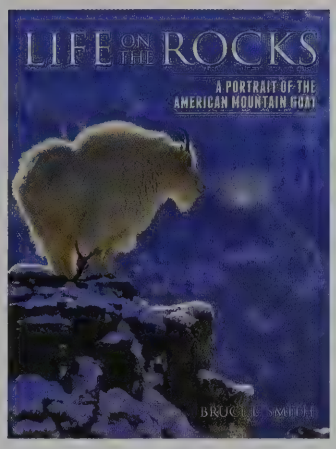
Sawtooth Mountains. For the next five years they lived with the growing wolf pack, documenting the animals' social interactions. The resulting book is a beautiful tribute to wolves, with lovingly rendered illustrations, handsome maps, and other artwork furnished by *National Geographic*. The images captured by the Dutchers are as intimate as any ever published of wild wolves (though hand-whelped, all were eventually released into the wilds of central Idaho). However, while including factual information about wolf introduction in the West, the book unfortunately perpetuates the myth that wolves are at risk of

being hunted to extinction. In fact, the Northern Rocky Mountain population remains strong and stable, at five times the U.S. Fish & Wildlife Service's initial recovery goal, even with several years of hunting and trapping. Wolf fans will love this book. Wolf biologists less so (likely raising their eyebrows at images of the Dutchers letting wolves lick their faces). And wolf critics? Let's just say this is not a book they'll want to include on their Christmas wish list. ■

Life on the Rocks: A Portrait of the American Mountain Goat

Bruce L. Smith. University Press of Colorado. 192 pp. $34.95

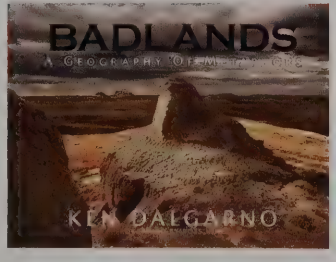
"I've watched a goat climb to the top of a dizzying pinnacle and stand with all four feet together on a summit measuring only eight inches square," writes recently retired U.S. Fish &



Wildlife Service wildlife biologist Bruce L. Smith in this comprehensive and visually compelling tribute to one of Montana's most remarkable animals. "Then he raised a hind foot, scratched behind one ear, and shook the dust from his coat, unimpressed with the feat as I looked on in wonder." Smith first began marveling at mountain goats as a student at the University of Montana in the early 1970s. He has been studying—and photographing—them ever since. The result of this 40-plus-year fascination is a coffee-table book that includes his personal accounts of following mountain goats across some of North America's harshest terrain, chapters on the animals' biology and conservation, and stunning photographs of the goats in their rocky, snow-clad environment. ■

Badlands: A Geography of Metaphors

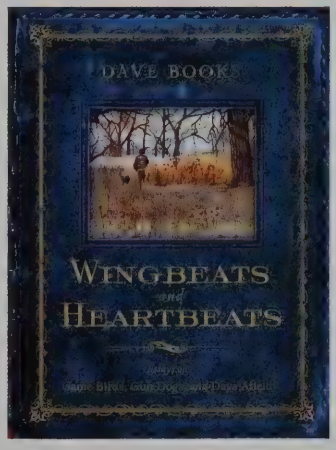
Ken Dalgarno. Red Deer Press. 162 pp. $45



The badlands need a public relations makeover, starting with the name. The arid landscapes of the northern Great Plains also need to shed their image as being known only for hiding outlaws, sending ranchers and farmers to the poorhouse, and reducing pioneer wagon trains to skeletons and dust. That's because the ornate and sometimes otherworldly stone formations of badlands have entranced visitors for thousands of years. They are beautiful, haunting, and spellbinding. Saskatchewan photographer and painter Ken Dalgarno's book is a visual tribute to these intriguing yet little understood landscapes—including Montana's Makoshika State Park, home to what he calls "the baddest" of the badlands and some of the region's tallest and most captivating hoodoos. ■

Wingbeats and Heartbeats: Essays on Game Birds, Gun Dogs, and Days Afield

Dave Books. University of Wisconsin Press. 228 pp. $21.95



A great writer helps you to see something you've looked at a thousand times but never noticed before. That's Dave Books, author of this collection of upland bird-hunting stories. Books, who was editor of *Montana Outdoors* from 1978 to 2001, is a hunter who pays attention—to the sound of a flushing Hungarian partridge, the quizzical look of a Brittany, and the journals of pioneers who wrote of sharptail nests so numerous that wagon wheels dripped with the yolks of broken eggs crushed underneath. Touched with gentle humor as well as shotgunning wisdom that can come only from a lifetime hunting the Upper Midwest and Montana's high plains, this rich collection of entertaining, informative stories will make you want to grab a shotgun, whistle up your dog, and head out the door. ■

A Field Guide to Yellowstone and Grand Teton National Parks

Kurt F. Johnson. Farcountry Press. 248 pp. $24.95

Earlier this year I was showing an old college buddy and his family around Yellowstone. I sure could have used this excellent field guide. His boys, ages 10 and 11, asked about everything they saw. I was fine answering questions about big game, most birds, and basic park history, but they also wanted to know about geology, geothermal features, insects, scat, and even the constellations. Yikes. With this book tucked in my pack I could have answered it all. In addition to the park's main wildlife attractions—bison, elk, pronghorn, wolves, and moose—the easy-to-use guide features detailed color photographs of moths, butterflies, dragonflies, water bugs, beetles, and plants—including every flower you'd ever see in Yellowstone as well as all the major tree species. Finally I can show visitors just how "knowledgeable" I really am about the park. ■

Photographing Montana

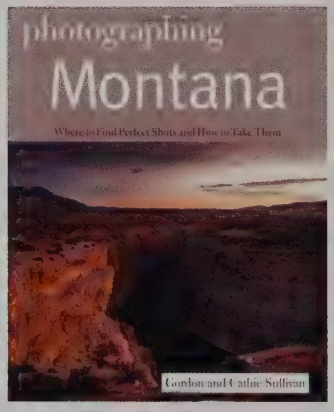
Gordon and Cathie Sullivan. Countryman Press. 112 pp. $14.95

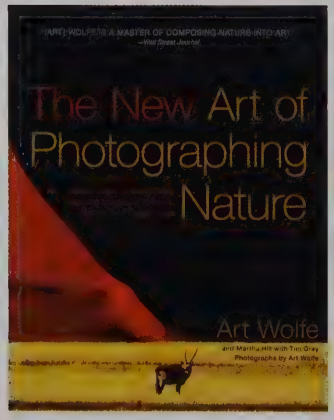
The New Art of Photographing Nature

Art Wolfe and Martha Hill. Amphoto Books. 224 pp. $29.99

Great wildlife and scenic photography is part luck and part patience. But mostly it's a refined skill, acquired from years of practice. Like any craft, photography can be learned from experts like the authors of these two books, which offer advice on lighting, perspective, composition, scale, pattern, color, equipment, and more.

Gordon and Cathie Sullivan, of Libby, have collaborated on half a dozen books including *The Photographer's Guide to Glacier National Park* and *Photographing Indian Country*. In addition to technical instruction, this new book includes more than 100 of the couple's favorite sites for photographing Montana wildlife, remnants of pioneer life, and the state's most majestic landscapes.





In his book, photographer Art Wolfe discusses the creative process that goes into taking artistic shots of wildlife and scenery. Most enlightening are his discussions with former *Audubon* photo editor and co-author Martha Hill on techniques that transform a good nature photograph into a phenomenal one, like the Namibian gemsbok on the book's cover. ■

The Farmer in All of Us

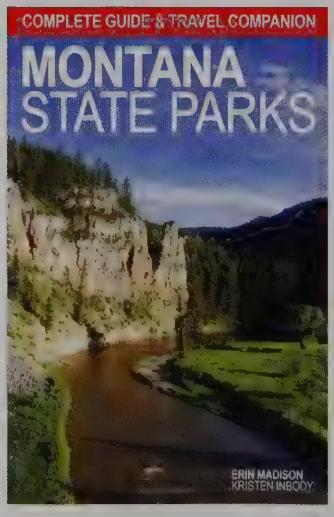
Paul Harvey. National Geographic. 304 pp. $45

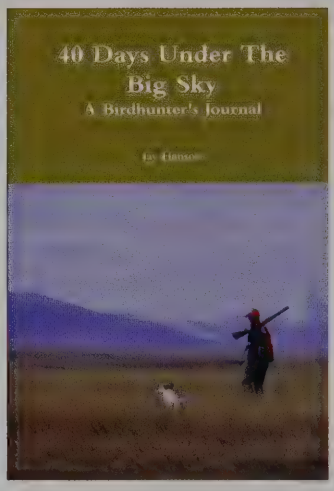
In 1900 a majority of Americans lived in rural areas. Even as recently as the 1960s most people had a relative who owned or worked on a farm or ranch. No longer. Americans are increasingly cut off from farming, ranching, and the men and women who grow crops and raise livestock. In that divide grows mistrust—by city folk who wonder why rural residents need federal subsidies, and by farmers and ranchers frustrated the urban majority doesn't seem to understand where their food comes from. Bridging that growing gap is this beautiful photography book published by National Geographic and Ram Trucks. Inspired by the 1978 speech "So God Made a Farmer" by the late broadcaster Paul Harvey, ten photographers traveled the United States over three weeks photographing the lives of farmers and ranchers, including those on a ranch in Montana's Sweet Grass Hills and others near Geraldine, Highwood, and Big Sandy. The images capture the patience, effort, and hope required to work the land, as well as the moments of beauty and serenity that accompany such a life, rugged as it is. ■

Montana State Parks: Complete Guide & Travel Companion

Erin Madison and Kristen Inbody. Riverbend Publishing. 190 pp. $19.95

To coincide with the 75th anniversary of Montana state parks, authors Erin Madison and Kristen Inbody, both *Great Falls Tribune* reporters, spent a year visiting all 55 parks and wrote this essential guide to these scenic, recreational, and historical sites. Each listing includes photographs, essentials on camping and other facilities, activities, a map, park history, and "Don't Miss" features. Inbody, who grew up in Choteau, writes that visiting all the parks helped her fall in love with Montana all over again: "Every state park was a chance to experience the state more deeply and understand a new facet. We have a gorgeous state." A portion of the proceeds goes to Montana's Outdoor Legacy Foundation to support Montana state parks management and operations. ■





40 Days Under the Big Sky: A Birdhunter's Journal

Jay Hanson. Self-published. 123 pp. $25

Ah, to be Jay Hanson. The editor of *Montana Sporting Journal*, Hanson lives the bird-hunting life many of us dream about. Here he takes readers through a season of hunting Montana's upland birds: ruffed grouse, blue grouse, sharptails, Hungarian partridge, sage-grouse, ring-necked pheasant, and even the elusive chukar, found only in a remote high-elevation desert southeast of Red Lodge near the Wyoming border. Based in Lewistown, Hanson has access to great bird hunting in all directions, but most of the 40 days documented in this journal are spent in Montana's northeastern region. This honest, clear-eyed account of upland bird hunting in Big Sky Country is written by a hunter with an ethical heart, friends with abundant private land access, and two well-trained English setters. If there's a heaven for upland bird hunters, it appears that Hanson is already there. ■

New Kids on the Block

ILLUSTRATION BY E.R. JENNE

An acquaintance the other week asked if Montana has raccoons. Well of course we do. What a silly question.

Then again, maybe it isn't. Depending on your age, you might have grown up in Montana without ever seeing some animals common today, like the raccoon and red fox.

Raccoons are Montana residents found just about everywhere in the state. They are nocturnal, meaning they work the graveyard shift while the rest of us sleep. We usually cross paths with this masked mammal only if we are out very late or up very early—or in the morning when we survey the damage from the night before: garbage strewn about, droppings on decks, and picnic coolers overturned or broken.

And while they now live nearly everywhere in Montana, from prairies to river bottoms to towns, that wasn't always true.

Although raccoons probably occurred in eastern Montana along the Yellowstone River at the time of Lewis and Clark, the expedition journals do not mention the species in Montana. The Corps of Discovery reported a raccoon in Missouri, then not again until the Columbia River in present-day Oregon. In the winter of 1806, from the shores of the Pacific Ocean, Meriwether Lewis wrote: *"The raccoon is found...on this coast in considerable quantities."*

According to Kerry Foresman, biology professor at the University of Montana and author of *Mammals of Montana*, raccoons moved from Idaho into the Bitterroot Valley in the 1940s, then to the Flathead Valley, and finally to central Montana via the Missouri River in the 1950s and '60s. They likely were also moving west along the Yellowstone River and its drainages during that same time.

Raccoons flourish around humans. We create shelter in old buildings, abandoned cars, and other accoutrements of civilization. We also provide all sorts of nourishment: pet food, garbage, even commercial crops. Raccoons love corn.

An elderly friend who grew up near Havre during the Depression once commented that she never saw a raccoon or red fox during her childhood. Havre, located in north-central Montana, would have been among the final areas inhabited by raccoons and one of the last holdouts against the red fox.

Like raccoons, red foxes are now found from Alaska and all the Canadian provinces south through the lower 48 states.

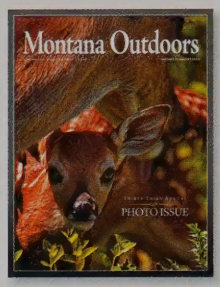
In Montana, this small member of the canine family probably spread from east and west to the center. Foresman says that as late as 1969, no evidence of red foxes existed in a line running from Liberty and Hill Counties on the Hi-Line southeast through Big Horn County. By the mid-1990s, however, trapping records indicate the animal was being taken in central Montana.

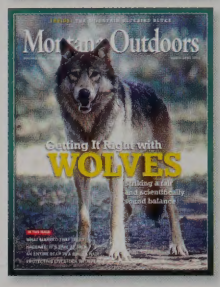
Like the raccoon, the red fox has benefited from human changes to the landscape. Most important, says Foresman, is the war humans wage on coyotes, a natural enemy of the red fox. This has provided abundant places for the smaller canid to thrive.

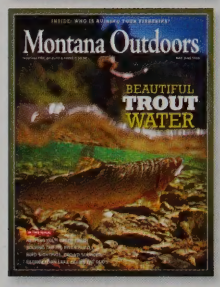
As proved again and again, nature hates a vacuum. Efforts to reduce wolf, coyote, and swift fox numbers have opened the habitat door for generalists like the raccoon and red fox.

Bruce Auchly manages the FWP regional Information and Education Program in Great Falls.

2014 *MONTANA OUTDOORS* INDEX







JANUARY–FEBRUARY 2014

33rd Annual Photography Issue

MARCH–APRIL 2014

How to Read a Tree Learn to decipher the stories that wildlife leave behind on bark and branches. By Ellen Horowitz

The Heart of Darkness Finding wildness and wonder in the night sky. By David Cronenwett

Weighing In On Wolves Montana works to strike a fair and biologically sound balance between having enough of the large carnivores and having too many. By Tom Dickson

Reading an Animal's "Fingerprints" DNA science improves fish and wildlife conservation, management, and law enforcement. By Ted Brewer

Turf War Twist Why mountain bluebirds have disappeared from western Montana's valleys—and might never return. By Renée A. Duckworth and Alexander V. Badyaev

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Problems by the Bucketful Illegal stocking is ruining many Montana sport fisheries and aquatic systems, maybe forever. By Tom Dickson

Bird Calls A new online checklist program turns recreational birders into global "biological sensors." By Jim Robbins

Cracking the Code Figuring out Montana's massive trout rivers when you're accustomed to fishing small streams. By Jeff Erickson

Sweet Surroundings Trout are just one reason to linger along streams and rivers. By Tom Dickson

A Fresh Approach Tips on keeping fish tasty for the table. By Jim Vashro

In the Clear Despite growing lakeside development, Georgetown Lake remains healthy and full of fish—for now. By Nick Gevock

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Bully Goats? Researchers try to figure out if relative newcomers to the Greater Yellowstone Area are displacing native bighorn sheep. By Jack Ballard

Untrammeled On its 50th anniversary, a look at the historical forces that forged the Wilderness Act, and what wildlands mean to us today. By Hal Herring

A Wall of Protection A comprehensive study on bear attacks in Alaska confirms that bear pepper spray is a better defense than firearms. By Christine Paige

Disappearing Acts The amazing ways that animals hide from us and each other. By Ellen Horowitz

SEPTEMBER–OCTOBER 2014

Finding a Way In Millions of acres of public hunting land in Montana appear inaccessible. How hunters and others are figuring out ways to get there. By Paul Queneau

Keeping the Faith Knowing he'd been lucky beyond measure to draw two coveted tags in one year, he wasn't going to let a little bad luck get in the way of filling them both. By Todd Wilkinson

Getting There Why going hunting can be every bit as essential as the hunt itself. By Allen Morris Jones

Congress Gives Wildlife a Boost Conservation leaders say the 2014 Farm Bill does much for Montana's pheasants, ducks, deer, songbirds, and other grassland wildlife. By Todd Wilkinson

A Hunter's Heavy Heart Over Sage-Grouse Essay. By Andrew McKean

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Black-Capped Chickadee

Poecile atricapillus

By David Cronenwett

JOHN ASHLEY

Winter is a time of narrow margins for wild creatures. As energy dissipates from the land, those that remain must be well suited to the task of survival. That is certainly the case with the black-capped chickadee, a remarkably adaptable and heartwarmingly cute year-round resident of Montana.

Description

For novice birders, not many species are easier to identify than the black-capped chickadee. This small bird has a telltale black head and bib that contrast strongly with its prominent white cheeks and neck nape. The breast is often whitish beneath, fading to buff on the bird's flanks. Its wings and back tend to be uniformly gray. Though both sexes have identical markings, males are slightly larger.

Three additional chickadees occur in our state: the mountain, the chestnut-backed, and the boreal. The mountain chickadee looks nearly identical to the black-capped except for its white eyebrow. The chestnut-backed has an auburn back and flanks, and the boreal has a brown cap and mostly gray neck nape.

Distribution and Habitat

The black-capped chickadee thrives in diverse wooded habitats across a large swath of North America. In Montana, the species is found in most coniferous and riparian forests as well as human-created "edge" environments where open areas and woodland intermingle. Even in Montana's vast eastern prairies, you can spot black-capped chickadees near brushy streams and in town around wooded areas.

Behavior

Black-capped chickadees are intelligent birds seemingly unafraid of humans. Their gentle, curious demeanor is endearing.

David Cronenwett is a writer and outdoor educator who lives in Choteau.

Scientific Name

Poecile atricapillus is Latin for "variegated black hair," referring to the various shades of black in the bird's plumage.

Commonly known as black-caps, these birds congregate in flocks of 4 to 16 individuals, especially in winter. When breeding season arrives, the winter flock disbands and male-female pair bonds establish. Nests are built in tree cavities left by woodpeckers or are sometimes excavated in rotten wood by chickadees themselves. Females lay an average of seven eggs, which hatch after incubating for roughly two weeks.

Winter Survival

Black-caps weigh on average only about 11 grams, compared to 77 grams for an American robin. Due to their higher surface-to-volume body ratio compared to larger animals, tiny creatures such as chickadees have developed higher metabolisms to stay warm. This requires large amounts of food—something particularly challenging in winter. For black-caps, that can mean consuming nearly 60 percent of their own body weight each day in cold weather. To survive, chickadees store seeds through summer and fall for winter consumption. The birds also eat seemingly invisible insects and spider eggs gleaned from tree bark. In the deepest cold, chickadees try to find a tree cavity for shelter and enter a torpor called "regulated hypothermia." A chickadee's core temperature decreases by up to 15 degrees Fahrenheit, slowing the burning of precious calories. Even still, it is possible for a black-cap to consume its day's accumulated calories by shivering for warmth all night long.

Communication

Back-capped chickadees have developed a complex system of calls, whistles, and songs used to convey information to each other. For instance, the birds can recognize and communicate the relative threat level of a predator by attaching more "dees" to their alarm call. Scientists suspect these complex vocalizations evolved to allow chickadees to convey information in the dense forests where they live, often out of sight of each other.

Memory

The black-capped chickadee's ability to find thousands of cache locations throughout a snow-covered forest requires phenomenal memory. Each fall, the spatial memory lobe of the bird's brain grows by up to 30 percent to accommodate this task. Since brain cells use up a lot of energy, those dedicated to food storage are kept only as long as they are needed. This astonishing ability to seasonally grow and reabsorb memory-specific neurons has not gone unnoticed by medical researchers hoping to find cures for diseases affecting the human brain.

Even if chickadees don't end up helping science cure Alzheimer's, the birds will always be a welcome tonic for the winter blues. For me, one of the joys of this season is observing chickadees at the feeder. Their inquisitive, gentle disposition always seems incongruous to the harsh reality of winter, making their enchanting company even more welcome.

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PARTING SHOT

BOLD LITTLE BIRD Remarkably tolerant of human presence, the black-capped chickadee will often hold still for a photographic closeup. Learn more about this charming winter resident on page 41. Join volunteers in counting these and other winter species during the 2014 Christmas Bird Count this holiday season. Details on page 10. Photo by Donald M. Jones.

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